US010653324B1

(12) **United States Patent**
Mbata

(10) **Patent No.: US 10,653,324 B1**
(45) **Date of Patent: May 19, 2020**

(54) **WRIST WORN CARBON MONOXIDE DETECTOR**

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(72) Inventor: **Kelechi Ignatius Mbata**, Somerset, NJ (US)

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

(21) Appl. No.: **16/601,995**

(22) Filed: **Oct. 15, 2019**

Related U.S. Application Data

(63) Continuation of application No. 16/563,835, filed on Sep. 7, 2019.

(51) **Int. Cl.**

A61B 5/0205	(2006.01)
A61B 5/1455	(2006.01)
A61B 5/00	(2006.01)
G01N 33/00	(2006.01)
G01N 33/48	(2006.01)
A61B 5/024	(2006.01)
A61B 5/08	(2006.01)

(52) **U.S. Cl.**

CPC ***A61B 5/0205*** (2013.01); ***A61B 5/14551*** (2013.01); ***A61B 5/681*** (2013.01); ***A61B 5/7425*** (2013.01); ***G01N 33/004*** (2013.01); ***G01N 33/0063*** (2013.01); ***G01N 33/0075*** (2013.01); ***G01N 33/48*** (2013.01); *A61B 5/02438* (2013.01); *A61B 5/082* (2013.01); *A61B 5/6831* (2013.01); *A61B 2560/0242* (2013.01)

(58) **Field of Classification Search**

CPC ... A61B 5/0205; A61B 5/14551; A61B 5/681; A61B 5/7425; A61B 5/02438; A61B 5/082; A61B 5/6831; A61B 2560/0242; G01N 33/004; G01N 33/0063; G01N 33/0075; G01N 33/48

See application file for complete search history.

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(57) **ABSTRACT**

An apparatus including a band; and a first device configured to attach to a person's wrist using the band; wherein the first device includes a first carbon monoxide level detector; wherein the first device includes a housing and a second device configured to be moved with respect to the housing from a first state to a second state; wherein in the first state a person cannot blow into the second device and cause a carbon monoxide level of the person's breath to be detected by the first carbon monoxide level detector; and wherein in the second state the person can blow into the second device and cause a carbon monoxide level of the person's breath to be detected by the first carbon monoxide level detector. The first device may include a second carbon monoxide level detector which is configured to detect a carbon monoxide level in ambient air.

20 Claims, 4 Drawing Sheets

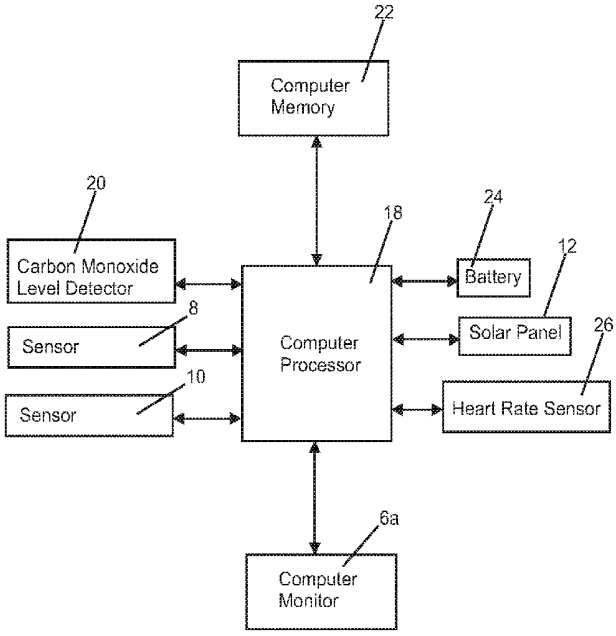


Fig. 1A

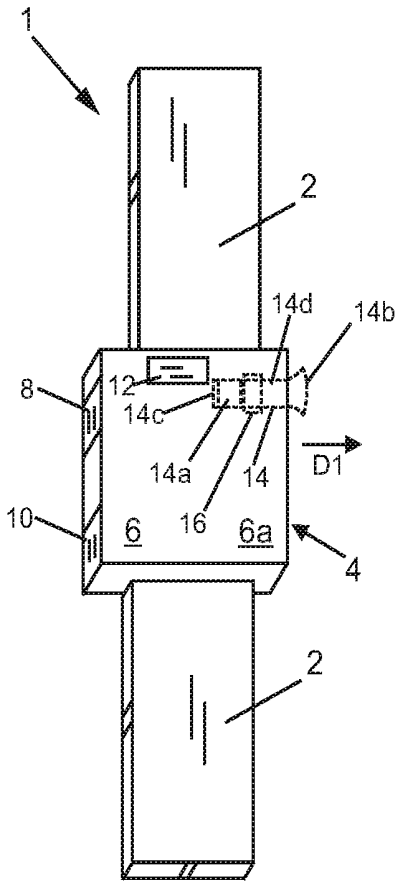

1
2
14d
14b
8
12
14c
14a
14
D1
10
6
16
6a
4
2

Fig. 1B

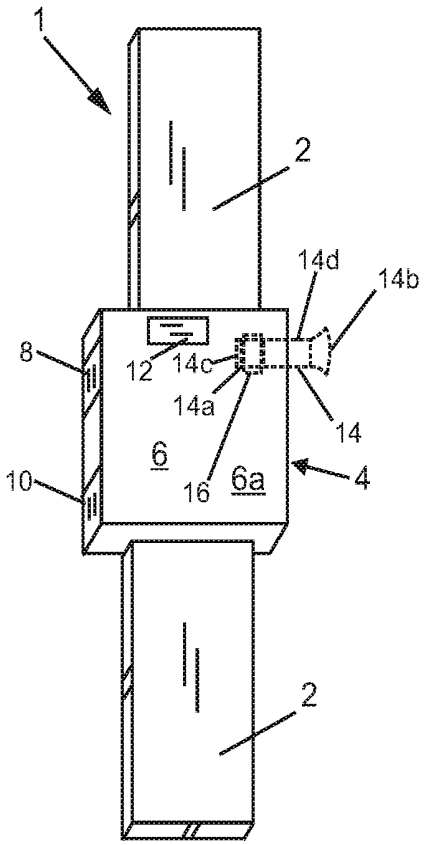

1
2
14d
14b
8
12
14c
14a
14
6
10
16
6a
4
2

Fig. 2A

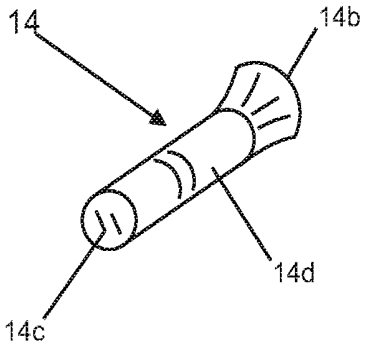


Fig. 2B

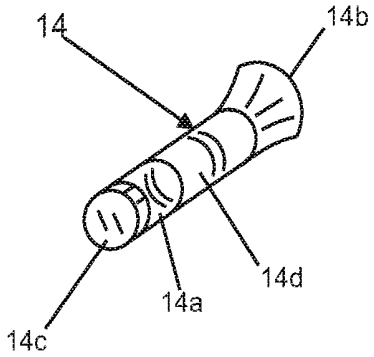


Fig. 3

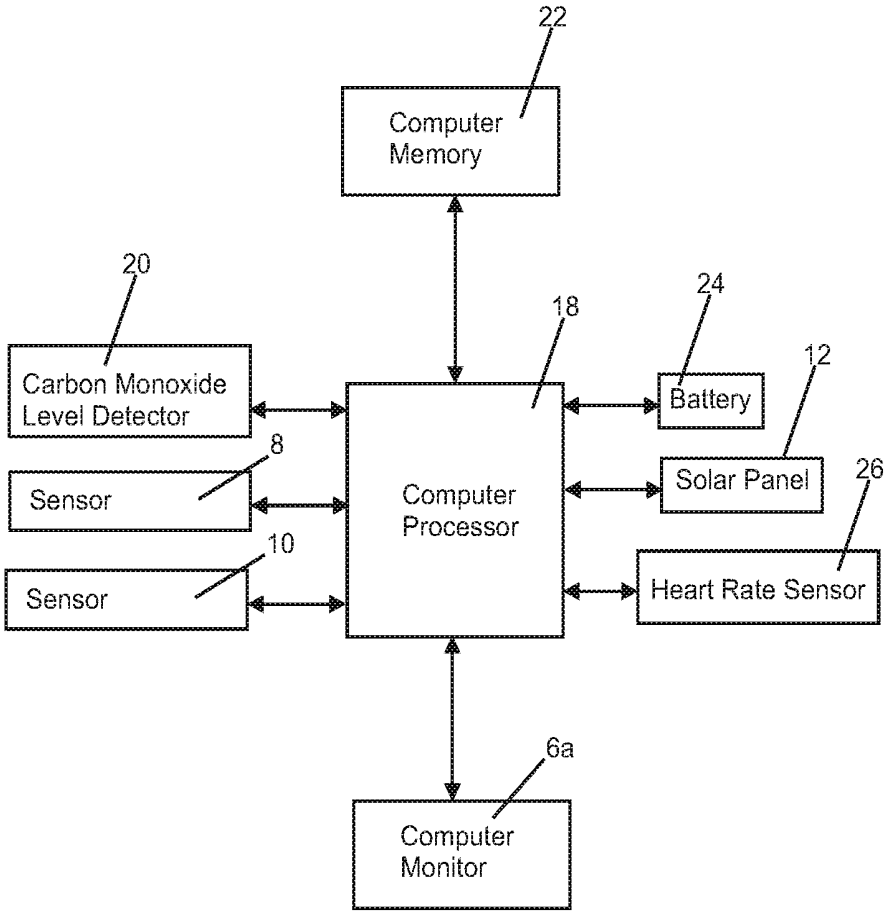

22
Computer Memory
20
18
24
12
Carbon Monoxide Level Detector
Battery
8
Sensor
Computer Processor
Solar Panel
26
10
Sensor
Heart Rate Sensor
6a
Computer Monitor

Fig. 4A

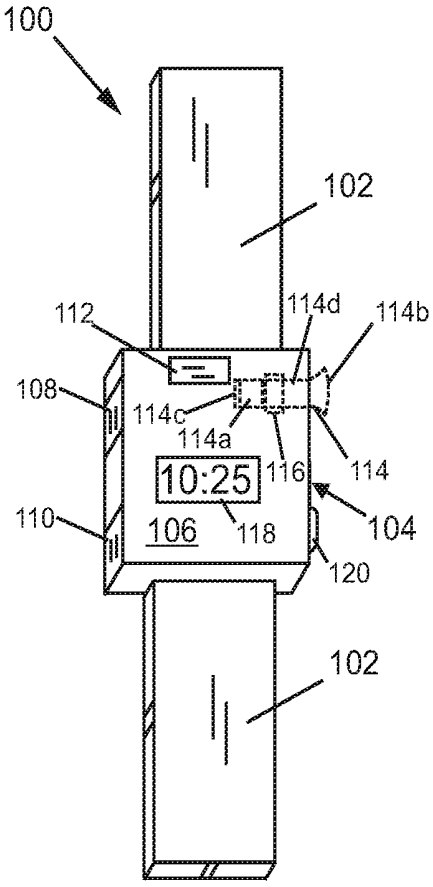
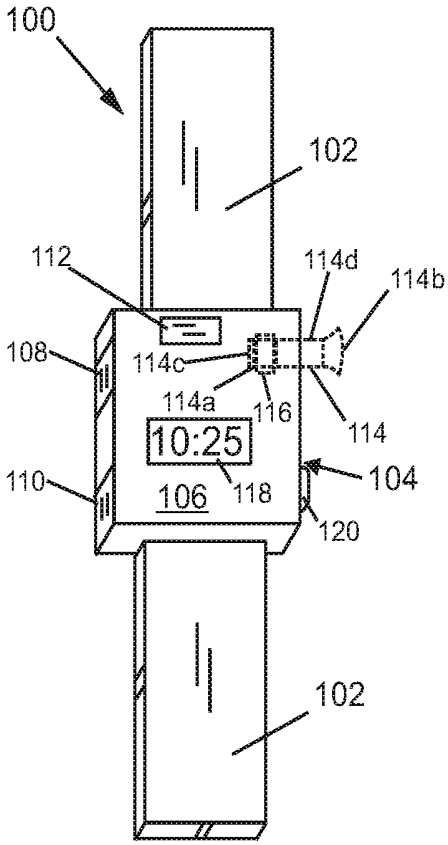

100
102
112
114d
114b
108
114c
114a
116
114
10:25
110
106
118
104
120
102

Fig. 4B


100
102
112
114d
114b
108
114c
114a
116
114
10:25
110
106
118
104
120
102

WRIST WORN CARBON MONOXIDE DETECTOR

CROSS REFERENCE TO RELATED APPLICATION(S)

The present application is a continuation of and claims the priority of U.S. patent application Ser. No. 16/563,835, titled "WRIST WORN CARBON MONOXIDE DETECTOR", filed on Sep. 7, 2019, inventor and applicant Kelechi Ignatius Mbata.

FIELD OF THE INVENTION

This invention relates to wrist worn detectors, such as smart watches.

BACKGROUND OF THE INVENTION

Generally, wearable technology providing various functions, such as various Apple (trademarked) watches are known in the art.

SUMMARY OF THE INVENTION

In at least one embodiment, a wrist worn carbon monoxide detector is provided which may in the form of a wrist watch or a bracelet. The detector may be configured and/or programmed to alert a user when carbon monoxide (CO) is detected.

In at least one embodiment, an apparatus is provided comprising a band; and a first device configured to attach to a person's wrist using the band; wherein the first device includes a first carbon monoxide level detector; wherein the first device includes a housing and a second device configured to be moved with respect to the housing from a first state to a second state; wherein in the first state a person cannot blow into the second device and cause a carbon monoxide level of the person's breath to be detected by the first carbon monoxide level detector; and wherein in the second state the person can blow into the second device and cause a carbon monoxide level of the person's breath to be detected by the first carbon monoxide level detector.

The first device may include a second carbon monoxide level detector which is configured to detect a carbon monoxide level in ambient air. The first device may include a computer display which is configured to display a carbon monoxide level of the person's breath detected by the first carbon monoxide level detector. The first device may include a computer display which is configured to display a carbon monoxide level of the person's breath detected by the first carbon monoxide level detector; and the computer display may also be configured to display a carbon monoxide level in ambient air detected by the second carbon monoxide detector.

In at least one embodiment, the first device may include a heart rate monitor and/or an SpO2 (peripheral capillary oxygen saturation) detector.

In at least one embodiment, a method is provided comprising attaching a first device to a person's wrist by a band; and moving a second device with respect to a housing of the first device, from a first state to a second state; wherein the first device includes a first carbon monoxide level detector; wherein in the first state a person cannot blow into the second device and cause a carbon monoxide level of the person's breath to be detected by the first carbon monoxide level detector; and wherein in the second state the person can blow into the second device and cause a carbon monoxide level of the person's breath to be detected by the first carbon monoxide level detector. The first device may be configured as previously specified.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**A shows a top, front, and left perspective view of an apparatus in accordance with an embodiment of the present invention, with the apparatus shown in a first state;

FIG. **1**B shows a top, front, and left perspective view of the apparatus of FIG. **1**A shown in a second state;

FIG. **2**A shows a top, left, and front perspective view of a tube having a handle for use with the apparatus of FIG. **1**A;

FIG. **2**B shows a bottom, left, and rear perspective view of the tube having the handle of FIG. **2**A;

FIG. **3** is a block diagram of components of the apparatus of FIG. **1**A;

FIG. **4**A shows a top, front, and left perspective view of another apparatus in accordance with an embodiment of the present invention, with the apparatus of FIG. **3**A shown in a third state; and

FIG. **4**B shows a top, front, and left perspective view of the apparatus of FIG. **3**A shown in a fourth state.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. **1**A shows a top, front, and left perspective view of an apparatus **1** in accordance with an embodiment of the present invention, with the apparatus **1** shown in a first state. The apparatus **1** may in the form of a bracelet, and may include a device **4** attached to a band **2**.

The device **4** may include a housing **6** to which a sensor **8** and a sensor **10** are attached and/or integrated with. The device **4** may also include a solar panel **12** for powering the sensor **8** and **10** and other components inside of and/or attached to the housing **6**. The housing **6** may have a computer monitor **6***a* integrated therewith. The device **4** may also include a device **14** which may in the shape of a tube integrated with a handle. The device **14** may have an open end **14***b*, a closed end **14***c*, a body portion **14***d*, and an opening **14***a* in the body portion **14***d*.

FIG. **3** is a block diagram of various components of the apparatus **1** of FIG. **1**A. The apparatus **1** may include a computer processor **18**, a carbon monoxide level detector **20**, a computer memory **22**, and a battery **24**, in addition to sensor **8**, sensor **10**, a computer monitor or display **6***a*, and a heart rate sensor **26**. The components **18**, **20**, **22**, **24**, and **26** may be located within the housing **6** and/or may be attached to and/or integrated with the housing **6** shown in FIG. **1**. The computer processor **18** may be electrically connected to and/or may communicate with components **20**, **22**, **24**, **12**, **8**, **10**, and **6***a*, in any known wired, wireless, optical, or any other known manner.

The device **4** may have an opening **16** which, in at least one embodiment leads to the carbon monoxide detector **20** which is part of the housing **6**, and which is used to detect carbon monoxide in someone's breath. In the first state, shown in FIG. **1**A, the shell of the body portion **14***d* covers the opening **16** of the carbon monoxide detector **20** of the housing **6**, so that a person's breath cannot be analyzed by the internal carbon monoxide detector of the housing **16**.

FIG. **1**B shows a top, front, and left perspective view of the apparatus **1** of FIG. **1**A shown in a second state. The device **14** has been pulled partially outwards from the housing **6** in the direction D**1**, from the first state of FIG. **1**A to the second state of FIG. **1**B. This causes the opening **14***a*

of the device **14** to be aligned with the opening **16** of the carbon monoxide detector **20** of the housing **6**. An individual can blow into the opening **14***b*, and the air passes through a hollow inner chamber of the body portion **14***d*, then through the opening **14***a* and into the opening **16** of the carbon monoxide detector **20** of the housing **6**. The computer processor **18**, in at least one embodiment, is programmed in accordance with computer software stored in the computer memory **22** to determine whether the breath received through opening **16** has a carbon monoxide content above a threshold and if so, the computer processor **18** is programmed to cause the sensor **8** to display the color red to indicate a concentration of carbon monoxide gas above a threshold. The sensor **8** may be a light emitting diode for example. The lighting of the sensor **8** red alerts a user of apparatus **1** to the presence of an unacceptable level of carbon monoxide, typically through the user's breath.

In at least one embodiment, as soon as user gets into an area or environment where user is exposed to a sufficient amount of carbon monoxide (CO), a display screen or LED of sensor **8** turns or lights red, such as in response to the computer processor **18**, alerting a user of the presence of CO, then a user can check the amount of CO present in the body by blowing air into the opening **16**, through the device **14**. The sensor **8** may sense carbon monoxide without the user blowing into the device **14**.

The opening **16** leading to internal carbon monoxide detector **20** in housing **6**, allows the user to blow into the opening **14***b*, leading to an inner chamber of **14***d*, out through opening **14***a* in the second state of FIG. **1**B, and into opening **16** to get a reading in ppm (parts per million) of the amount of carbon monoxide a person is being exposed from the computer monitor display **6***a* which may be located on the top face of the housing **6**. The computer processor **18** may be programmed to produce a reading in ppm (parts per million), in response to signals received from the carbon monoxide level detector **20**, and may cause the reading to be displayed on the computer monitor or display **6***a* or top face or surface monitor of the housing **6**, about five to ten seconds from blowing into opening **14***b*, in the second state of FIG. **1**B.

Sensor **10** shown in FIGS. **1**A and **1**B may be an audio alarm or a speaker. The computer processor **18** may be programmed by computer software stored in the computer memory **22** to cause an audio signal or sound to be emitted from the sensor or speaker **10** when the amount of carbon monoxide detected from a user breathing into end **14***b*, through inner chamber of **14***d*, through opening **14***a* and into opening **16**, is at least fifty ppm (parts per million). The solar panel **12** of the apparatus **1** may recharge the battery **24** through the computer processor **18** and/or directly. The solar panel **12** may generally provide power to the components **8**, **10**, **6***a*, **18**, **20**, **22**, and **24**. The battery **24** may be stored in the housing **6** for providing power to components **8**, **10**, **12**, **6***a*, **18**, **20**, **22**, and **24** and internal circuitry of housing **6**. The solar panel **12** helps the apparatus **1** to last for a period when the battery **24** runs down.

FIG. **2**A shows a top, left, and front perspective view of the device **14**. FIG. **2**B shows a bottom, left, and rear perspective view of the tube having the handle of FIG. **2**A. The device **14** is shaped as a hollow tube having a flared handle at an end **14***b*. The end **14***b* has an opening so that air can be blown into a hollow chamber of body portion **14***d* through end **14***b*, and then can flow out of the opening **14***a*. The end **14***c* is closed.

FIG. **4**A shows a top, front, and left perspective view of an apparatus **100** in accordance with an embodiment of the present invention, with the apparatus **100** of FIG. **4**A shown in a third state. FIG. **4**B shows a top, front, and left perspective view of the apparatus **100** of FIG. **4**A shown in a fourth state.

The apparatus **100** may be identical to the apparatus **1** of FIGS. **1**A and **1**B, except as will be described. The apparatus **100** may be a watch which may have a time display or monitor **118** which shows a time of 10:25 in both FIGS. **4**A and **4**B.

The apparatus **100** may have components **102**, **108**, **110**, **112**, and **114** which may be identical or substantially similar to components **2**, **8**, **10**, **12**, and **14** of the apparatus **1** of FIGS. **1**A and **1**B. The apparatus **100** may have a device **104** which may be identical to the device **4** of the apparatus **1**, with the exception of time monitor or display **118**, and watch knob **120**, and in at least some embodiments, there may be some additional electronic components and/or other components which may be part of the housing **106** of FIG. **4**A versus the housing **6** of FIG. **1**A.

Similar or identical to FIG. **1**A, the device **114** may be partially pulled outwards from the housing **106** to allow someone to blow air through the end **114***b*, into an inner chamber in the body portion **114***d*, out an opening **114***a* and into an opening **116** leading to a carbon monoxide detector inside the housing **106**. If carbon monoxide is detected above a threshold, the sensor **108** may emit an audio alarm.

The wrist watch apparatus **100** may operate, in at least one embodiment, the same way as the apparatus **1**, with regards to the number of sensors, such as sensors **108**, **110**, monitor **106***a* which may be identical and/or similar to sensors **8**, **10**, and monitor **6***a*. The apparatus **100** may include a known knob or dial to control the watch time display **118**.

The device **104** may include the components shown in FIG. **3**, attached to and/or integrated with the housing **106**. The time monitor or display **118** may communicate with the computer processor **18** which may be inside of the housing **106**. The watch knob **120** may also communicate with the computer processor **18** which may be inside of the housing **106**.

The apparatus **1** and/or **100** helps to save lives by detecting carbon monoxide.

In at least one embodiment, the sensor **8** may be a carbon monoxide detector which displays the color red as soon as a sufficient level of Carbon Monoxide is detected as determined by the computer processor **18** programmed by the computer memory **22**. The display of the color red by sensor **8** alerts the user to the presence of an unacceptably high level of CO in the environment or area where the user is. In at least one embodiment, after a user sees the sensor **8** light red, the user can now check the amount of CO present in the user's body by pulling the device **14** from the state of FIG. **1**A to the state of FIG. **1**B. Alternatively, the device **14** may be oriented with respect to the opening **16** to push the device **14** to allow air to be blown into device **14**, into opening **16** of the carbon monoxide level detector **20**. With the device **14** in the state of FIG. **1**B, a user may blow into the inner chamber within device **14**, into opening **16** of the internal carbon monoxide level detector **20**. The computer processor **18** receives one or more signals related to the level of carbon monoxide and, in at least one embodiment, causes a reading to be displayed on the computer monitor **6***a* within seconds. In at least one embodiment, the computer processor **18** may be programmed by computer software stored in the computer memory **22** to cause the sensor or speaker **10** to emit an audio alarm or sound when the user's CO level as determined by the carbon monoxide level detector **20** and the computer processor **18**, gets to fifty ppm (parts per

million). In at least one embodiment, the sensor **8** includes its own carbon monoxide detector, and the sensor **8** or the sensor **10** may provide signals to the computer processor **18** which cause the audio alarm to go off, without the need for someone to blow into the device **14**, opening **16**, and into the carbon monoxide detector **20**.

The heart rate sensor **26**, in at least one embodiment, is located opposite to the monitor **6***a*, so that the heart rate sensor **26** will be against a user's skin who is wearing the apparatus **1**. The heart rate sensor **26** monitors SpO2 (peripheral capillary oxygen saturation, an estimate of amount of oxygen in the blood) and heart rate of a user, and provides signals to the computer processor **18** indicating heart rate and SpO2 levels. The computer processor **18** causes a sound or alarm to be emitted, such as from the sensor **10**, when heart rate is less than a lower limit, which may be sixty beats per minute or greater than an upper limit, which may be one hundred beats per minute, wherein these limits may be stored in the computer memory **22**. The computer processor **18** may also cause a sound or audio alarm to be emitted from the sensor **10** when Spo2 (peripheral capillary oxygen saturation, an estimate of amount of oxygen in the blood) is less than a lower limit, such as ninety-two.

Although the invention has been described by reference to particular illustrative embodiments thereof, many changes and modifications of the invention may become apparent to those skilled in the art without departing from the spirit and scope of the invention. It is therefore intended to include within this patent all such changes and modifications as may reasonably and properly be included within the scope of the present invention's contribution to the art.

I claim:

1. An apparatus comprising:

a band; and

a first device configured to attach to a person's wrist using the band;

wherein the first device includes a first carbon monoxide level detector;

wherein the first device includes a housing and a second device configured to be moved with respect to the housing from a first state to a second state;

wherein in the first state a person cannot blow into the second device and cause a carbon monoxide level of the person's breath to be detected by the first carbon monoxide level detector;

wherein in the second state the person can blow into the second device and cause a carbon monoxide level of the person's breath to be detected by the first carbon monoxide level detector;

wherein in the first state the second device covers an opening leading to the first carbon monoxide level detector so that a person's breath cannot be analyzed by the first carbon monoxide level detector through the second device; and

wherein in the second state the second device does not cover the opening leading to the first carbon monoxide detector, so that a person's breath can be analyzed by the first carbon monoxide level detector through the second device.

2. The apparatus of claim **1** wherein the first device includes a second carbon monoxide level detector which is configured to detect a carbon monoxide level in ambient air.

3. The apparatus of claim **2** wherein

the first device includes a computer display which is configured to display a carbon monoxide level of the person's breath detected by the first carbon monoxide level detector; and

the computer display is also configured to display a carbon monoxide level in ambient air detected by the second carbon monoxide detector.

4. The apparatus of claim **2** wherein

the second carbon monoxide detector emits a colored light when a sufficient amount of carbon monoxide is detected.

5. The apparatus of claim **1** wherein

the first device includes a computer display which is configured to display a carbon monoxide level of the person's breath detected by the first carbon monoxide level detector.

6. The apparatus of claim **1** wherein the first device includes a heart rate monitor.

7. The apparatus of claim **1** wherein

the first device includes an SpO2 detector.

8. The apparatus of claim **1** wherein

the second device has a hollow inner chamber which can be accessed through an opening;

and wherein the second device is configured so that an individual can blow into the opening of the second device, and as a result air passes through the hollow inner chamber and into the opening of the carbon monoxide detector in the second state.

9. The apparatus of claim **8** wherein

the second device is shaped as a hollow tube having a flared handle at the opening of the second device.

10. The apparatus of claim **1** wherein

the second device is configured to be partially pulled outwards from the housing to change from the first state to the second state.

11. A method comprising the steps of:

attaching a first device to a person's wrist by a band; and

moving a second device with respect to a housing of the first device, from a first state to a second state;

wherein the first device includes a first carbon monoxide level detector;

wherein in the first state a person cannot blow into the second device and cause a carbon monoxide level of the person's breath to be detected by the first carbon monoxide level detector; and

wherein in the second state the person can blow into the second device and cause a carbon monoxide level of the person's breath to be detected by the first carbon monoxide level detector;

wherein in the first state the second device covers an opening leading to the first carbon monoxide level detector so that a person's breath cannot be analyzed by the first carbon monoxide level detector through the second device; and

wherein in the second state the second device does not cover the opening leading to the first carbon monoxide detector, so that a person's breath can be analyzed by the first carbon monoxide level detector through the second device.

12. The method of claim **11** wherein

the first device includes a second carbon monoxide level detector which is configured to detect a carbon monoxide level in ambient air.

13. The method of claim **12** wherein

the first device includes a computer display which is configured to display a carbon monoxide level of the person's breath detected by the first carbon monoxide level detector; and

the computer display is also configured to display a carbon monoxide level in ambient air detected by the second carbon monoxide detector.

14. The method of claim **12** wherein

the second carbon monoxide detector emits a colored light when a sufficient amount of carbon monoxide is detected.

15. The method of claim **11** wherein

the first device includes a computer display which is configured to display a carbon monoxide level of the person's breath detected by the first carbon monoxide level detector.

16. The method of claim **11** wherein the first device includes a heart rate monitor.

17. The method of claim **11** wherein the first device includes an SpO2 detector.

18. The method of claim **11** wherein

the second device has a hollow inner chamber which can be accessed through an opening;

and wherein the second device is configured so that an individual can blow into the opening of the second device, and as a result air passes through the hollow inner chamber and into the opening of the carbon monoxide detector in the second state.

19. The method of claim **11** wherein

the second device is configured to be partially pulled outwards from the housing to change from the first state to the second state.

20. The method of claim **11** wherein

the second device is shaped as a hollow tube having a flared handle at the opening of the second device.

* * * * *

专利名称(译)	腕戴式一氧化碳检测仪		
公开(公告)号	US10653324	公开(公告)日	2020-05-19
申请号	US16/601995	申请日	2019-10-15
发明人	MBATA, KELECHI IGNATIUS		
IPC分类号	A61B5/0205 A61B5/00 A61B5/08 A61B5/024 G01N33/48 G01N33/00 A61B5/1455		
CPC分类号	G01N33/0075 G01N33/004 A61B5/7425 A61B5/681 A61B5/0205 G01N33/48 G01N33/0063 A61B5/14551 A61B2560/0242 A61B5/02438 A61B5/082 A61B5/6831		
代理人(译)	TENCZA，JR.，J. WALTER		
外部链接	Espacenet		

摘要(译)

一种设备，包括乐队； 第一设备，其被配置为使用所述带子附接到人的手腕上； 其中第一设备包括第一一氧化碳水平检测器； 其中，第一装置包括壳体和第二装置，第二装置构造成相对于壳体从第一状态移动到第二状态。 其中，在第一状态下，人不能吹入第二装置，并且不能通过第一一氧化碳水平检测器检测到人的呼吸中的一氧化碳水平； 其中，在第二状态下，人可以吹入第二装置，并由第一一氧化碳水平检测器检测人的呼吸中的一氧化碳水平。 所述第一设备可以包括第二一氧化碳水平检测器，其被配置为检测环境空气中的一氧化碳水平。