



US006670887B2

(12) **United States Patent**
Dungan

(10) **Patent No.:** US 6,670,887 B2
(45) **Date of Patent:** Dec. 30, 2003

(54) **APPARATUS AND METHOD FOR WIRELESS GAS MONITORING**

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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 351 days.

(21) **Appl. No.:** 09/854,748

(22) **Filed:** May 14, 2001

(65) **Prior Publication Data**

US 2001/0040509 A1 Nov. 15, 2001

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/333,352, filed on Jun. 15, 1999, now Pat. No. 6,252,510.

(60) Provisional application No. 60/122,863, filed on Mar. 4, 1999, and provisional application No. 60/104,223, filed on Oct. 14, 1998.

(51) **Int. Cl.⁷** G08B 17/10

(52) **U.S. Cl.** 340/632; 340/633; 340/539.26

(58) **Field of Search** 340/501, 506, 340/509, 539.1, 539.26, 521, 522, 632, 633, 634; 73/23.2, 23.31, 31.02, 31.03

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Gas Detection Systems, Inc. publication entitled "GDS-2000 Teledetection System", published prior to Oct. 14, 1998.

B & W Technologies Ltd. publication entitled "Wireless Multi-point Gas Monitoring-Rig Rat", published prior to Oct. 14, 1998.

Photographs (2) of Georgia Gulf Corporation installation in Louisiana prior to Oct. 14, 1998. Printing designating various components of the installation has been added to the photographs.

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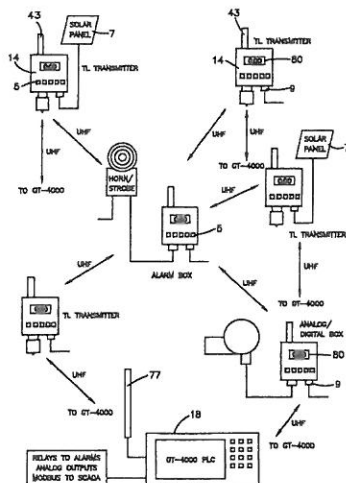
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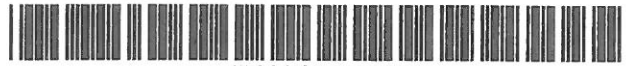
(57) **ABSTRACT**

The current invention provides a wireless monitoring system. The system has one or more monitoring devices. Each device can transmit data and receive messages from an output center or alarm system. The output center can also transmit and receive messages. Both the output center and each device preferably have a transceiver that enables both the transmission and receipt of messages. No remote terminal units hardwiring is required for the system to function. The system is truly a wireless gas monitoring system. The system may use low earth orbit satellite technology, or licensed radio frequencies or any other means to wirelessly transmit and receive messages.

64 Claims, 17 Drawing Sheets



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US006794991B2

(12) **United States Patent**
Dungan

(10) **Patent No.:** **US 6,794,991 B2**

(45) **Date of Patent:** **Sep. 21, 2004**

(54) **MONITORING METHOD**

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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 323 days.

(21) **Appl. No.:** **10/062,320**

(22) **Filed:** **Jan. 31, 2002**

(65) **Prior Publication Data**

US 2002/0070869 A1 Jun. 13, 2002

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/854,748, filed on May 14, 2001, now Pat. No. 6,670,887, which is a continuation-in-part of application No. 09/333,352, filed on Jun. 15, 1999, now Pat. No. 6,252,510.

(51) **Int. Cl.⁷** **G08B 17/10**

(52) **U.S. Cl.** **340/632; 340/539.19; 340/539.22; 340/693.5**

(58) **Field of Search** **340/632, 539.17, 340/539.19, 539.22, 539.26, 539.3, 693.5**

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Primary Examiner—Daniel J. Wu

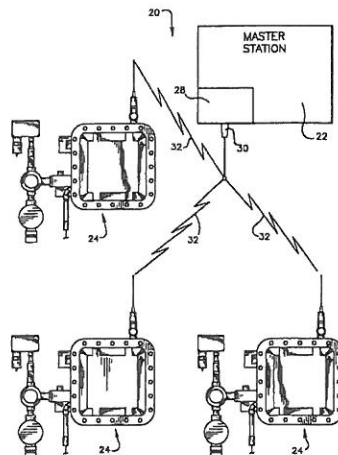
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(57) **ABSTRACT**

A monitoring system includes a master station and a plurality of monitor stations which are spaced from the master station. Each of the monitor stations includes a programmable computer which is connected with a radio and a sensor. The computer and radio may be enclosed in an explosion-proof housing. To change a program in the computer at a monitor station, the program change may be transmitted from the master station to the monitor station. In addition, data relating to a condition to be sensed may be transmitted from the master station to the monitor station.

114 Claims, 7 Drawing Sheets



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