A system for locating golf balls includes a golf ball (12) containing a transmitter (14) and a locator (16) carried by a golfer (20). The locator detects a signal (18) from the transmitter (14) and indicates a direction of the transmitter and hence the golf ball. In one embodiment, the distance to the golf ball is also indicated.
GOLF BALL LOCATOR

FIELD OF THE INVENTION

[0001] This invention relates to a system for locating golf balls, and more particularly to a system for using a global positioning satellite for locating a position of a golf ball with respect to a player.

BACKGROUND OF THE INVENTION

[0002] Currently, golfers lose golf balls without any practical way to locate them, other than visual observation. The problem arises for both novice and experienced golfers regardless of the visual acuity of the golfer. Losing a golf ball can have adverse consequences, such as a penalty stroke for dropping another ball, and the cost of buying additional golf balls, which is not insignificant.

[0003] Often, golf courses impose time limits upon play because of the number of other players behind the group, which does not provide golfers with sufficient time to visually inspect all areas of the course for lost balls. Visual observation is made more difficult by the topography of the golf course and the fact that golfers often cover great distances in a golf cart. If the golfer passes the ball, it is almost impossible to locate it again in the grass, and even more difficult to locate it if it is in a rough area.

[0004] Because long drives result in losing visual contact with the ball, any visual locating system provides nothing more than a guess. Recognizing this problem, several inventions to locate golf balls have been proposed. U.S. Pat. No. 6,383,095 describes a stake, which marks the location of a golf ball otherwise hidden by tall grass in a golf course rough area. U.S. Pat. No. 6,353,386 proposes a locating system wherein an electric circuit is triggered by detection of a predetermined odor. However, there can be indigenous substances at the golf course that interfere with an odor, therefore preventing odor detection. Moreover, there could be electronic interference preventing the triggering of the electric circuit. U.S. Pat. No. 6,320,173 describes a system of tracking golf balls by using a solid-state camera to determine the distance between the camera and the ball. The topography could, of course, interfere with the viability of this system, as with any visual system.

[0005] There have been significant improvements to the technology used in golfing over the years. For example, many golf carts now use GPS (global positioning satellite) tracking in golf carts, but these systems only disclose the distance between the cart and the hole, not the distance between the golfer and the golf ball or the direction of the golf ball.

[0006] U.S. Pat. No. 6,496,141 proposes a position determining system for golf courses using both GPS and WAAS (Wide Area Augmentation System). In this system, a hand held unit is interconnected with a cart-based unit to exchange signals to correct location information. Similarly, U.S. Pat. No. 6,456,938 uses a GPS and a computer system to map a golf course.

[0007] The purpose of the instant invention is to create a golf ball locating system that is both quick and reliable. Using advances in technology, which pinpoints golf ball location, the age-old problem of lost golf balls can be essentially eliminated.

SUMMARY OF THE INVENTION

[0008] Briefly, according to one aspect of the present invention, a system for locating golf balls comprises a golf ball containing a transmitter. A locater, typically carried by a player, detects a signal from the transmitter and a direction and distance to the transmitter and hence to the golf ball.

[0009] According to one embodiment of the invention, a GPS (global positioning satellite) detector in the golf ball transmits a position of the golf ball to a locator. A second GPS at the locator indicates the position of both the locator and the GPS.

[0010] According to another embodiment of the invention, a locator comprises a transmitter. A transponder in the golf ball augments and retransmits a signal generated by the locator, which is then detected by the locator. In yet another embodiment, transponders in different golf balls have individual identifiers for differentiating between golf balls.

[0011] The invention and its objects and advantages will become more apparent in the detailed description of the preferred embodiment presented below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a perspective view of a system for locating golf balls according to the present invention showing a golf ball with a transmitter and various alternative locator positions.

[0013] FIG. 2 is a perspective view of another embodiment of the present invention for locating golf balls showing a satellite and a golf ball containing a GPS (global positioning satellite) tracking device.

DETAILED DESCRIPTION OF THE INVENTION

[0014] The present invention will be directed in particular to elements forming part of, or in cooperation more directly with, the apparatus in accordance with the present invention. It is to be understood that elements not specifically shown or described may take various forms well known to those skilled in the art.

[0015] A system for locating golf balls is referred to in general by numeral 10. The system comprises a golf ball 12 containing a transmitter 14 and a locator 16 which detects a signal 18 from said transmitter.

[0016] In a preferred embodiment of the invention, transmitter 14 emits a continuous, low strength signal 18. The signal has a low strength and carries only for a limited distance in order to comply with FCC regulations. As golfers are well aware, golf balls are often obscured by grass 22, depressions in the fairway, brush, and other obstructions. When a golfer 20 loses track of her ball, she uses locator 16 to detect signals from the golf ball, which are not blocked by vegetation.

[0017] Locator 16 may be comprised of a simple radio receiver tuned to the radio frequency of the transmitter 14. In this embodiment, the golfer 20 would determine when she was getting closer to the golf ball 12 by an increase in the strength of signal 18. Conversely, she would be able to determine if she was moving away from the golf ball by a
decrease in the strength of signal 18. This is a very rough, but effective way to aid in the location of golf balls.

[0018] A more efficient way of locating lost golf balls uses a directional antenna 17 on locator 16. The directional antenna 17 may be a simple loop antenna on the radio receiver of locator 16 or an equivalent device incorporated in a circuit board internal to the radio receiver. The directional antenna indicates the direction of the golf ball when the locator 16 is pointed in the direction of the golf ball. The directional antenna 17 may be used in combination with signal strength to give both direction and distance to the golf ball.

[0019] An audible tone 24 may be used to indicate detection of a golf ball, direction of the golf ball, and distance to the golf ball. These indications may be by variations in the tone or frequency of the golf ball, or by amplitude of the tone, or both. A liquid crystal diode (LCD) screen 26 may also be used to indicate the distance, direction, and position of the golf ball. The position may be relative to the golfer or it may be geographic, based on a global positioning satellite (GPS) detector, discussed in more detail below.

[0020] Locator 16 may be a handheld unit held by an individual golfer 20 or it may be mounted on a golf cart 28. Mounting locator on a golf cart would reduce the requirement to miniaturize equipment components, thereby reducing costs. In addition, many golf carts have GPS capability, which can be shared by the locator.

[0021] Another location for locator 16 is clubhouse 30. Mounting the locator 16 at the clubhouse allows for operation of more powerful detection equipment than could be carried in a battery operated handheld device or a cart-mounted device. When the locator is mounted at the clubhouse, transmitter 32 transmits location information to individual golfers. Information transmitted to individual golfers is allocated to different frequency bands or channels as is well known in the art.

[0022] A central base station at the golf course clubhouse and numerous mobile units that are either mounted on golf carts or carried by the golfer offers several advantages. The mobile units typically store a database of records that include the locations of various points of interest on the golf course. The base station unit calculates its GPS position from GPS signals and compares the calculated position signal to the known fixed location of the base station to compute a differential position correction. These differential position corrections are transmitted to the mobile units to enable the mobile units to correct for accumulated position error and to thereby determine a more accurate position estimate than would otherwise be possible with an uncorrected GPS position reading. A central station with remote mobile units may also be less expensive than equipping each mobile unit with GPS capability.

[0023] Since golf is a social game, on any given day, it is likely that more than one golfer will be playing on a particular golf course. In order to locate individual golf balls, an individual signal for each golf ball is desirable. The differences between individual golf balls may be based on a different frequency, digital code, or other attribute incorporated in each golf ball transmitter or transponder. Regardless of the mechanism used, each golf ball transmitter or transponder will have a unique radio frequency identification code. For example, golf ball 13, will transmit on a different frequency 19 than golf ball 12, and thus not be detected by locator 16, or if detected, it will be detected as a different ball.

[0024] Referring now to FIG. 2, golfer 20 is using a locator 16, which is capable of receiving position information from a Global Positioning Satellite (GPS). In this embodiment, golf ball 12 contains a transmitter/receiver 15. The transmitter/receiver detects signals 42 from one or more satellites 40. The GPS signals are used by the transmitter/receiver 15 to calculate a geographic position of golf ball 15. This information is transmitted by signal 18 to locator 16 held by the golfer.

[0025] The locator 16 also receives GPS signals 42. The GPS signal 42 enables the golfer to determine his position. Geographically. A microprocessor contained in locator 16 determines a relative direction and distance from the golfer 20 to the golf ball 12 based on the geographic position of both the golfer and the golf ball. The direction and distance may be shown on a LCD screen 34 as is well known in the art.

[0026] The direction and distance and location may also be superimposed on a map of the golf course and displayed on the LCD screen. Other information may be provided based on geographic location of both the ball and the pin 51, such as distance to the hole 50. Additional information may also be provided from the clubhouse 30 transmitter 32, such as wind direction and speed. This information may also be displayed graphically on the LCD screen.

[0027] The invention has been described in detail with particular reference to certain preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the scope of the invention.

[0028] Parts List

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>0029</td>
<td>10 system for locating golf balls</td>
</tr>
<tr>
<td>0030</td>
<td>12 golf ball</td>
</tr>
<tr>
<td>0031</td>
<td>13 golf ball</td>
</tr>
<tr>
<td>0032</td>
<td>14 transmitter</td>
</tr>
<tr>
<td>0033</td>
<td>15 transmitter/receiver</td>
</tr>
<tr>
<td>0034</td>
<td>16 locator</td>
</tr>
<tr>
<td>0035</td>
<td>17 antenna</td>
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<tr>
<td>0036</td>
<td>18 signal</td>
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<td>19 signal</td>
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<td>24 audible tone</td>
</tr>
<tr>
<td>0041</td>
<td>26 liquid crystal diode (LCD) screen</td>
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<tr>
<td>0042</td>
<td>28 golf cart</td>
</tr>
<tr>
<td>0043</td>
<td>30 clubhouse</td>
</tr>
<tr>
<td>0044</td>
<td>32 transmitter</td>
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<tr>
<td>0045</td>
<td>40 satellite</td>
</tr>
<tr>
<td>0046</td>
<td>42 satellites signal</td>
</tr>
</tbody>
</table>
What is claimed is:

1. A system for locating golf balls comprising:
   a golf ball containing a transmitter; and
   a locator which detects a signal from said transmitter and
   a direction of said transmitter.
2. A system for locating golf balls as in claim 1 wherein
   said locator determines a distance to said transmitter.
3. A system for locating golf balls as in claim 2 wherein
   said locator determines said distance to said transmitter
   based on a strength of said signal.
4. A system for locating golf balls as in claim 1 wherein
   said transmitter has a unique radio frequency identification
   code.
5. A system for locating golf balls as in claim 1 wherein
   said locator determines said direction to said transmitter
   based on an orientation of an antenna on said locator.
6. A system for locating golf balls comprising:
   a golf ball containing a global positioning satellite (GPS)
   detector and a transmitter;
   a locator which contains a GPS detector, a receiver, and
   a microprocessor;
   wherein said transmitter transmits golf ball GPS position
   coordinates to said locator;
   wherein said receiver detects a signal from said transmitter;
   wherein said microprocessor calculates a distance and
   direction to said golf ball based on a GPS position of
   said golf ball and a GPS position of said locator.
7. A system for locating golf balls as in claim 6 wherein
   said locator is mounted in a handheld device.
8. A system for locating golf balls as in claim 6 wherein
   said locator is mounted in golf bag.
9. A system for locating golf balls as in claim 6 wherein
   said locator is mounted on a golf cart.
10. A system for locating golf balls as in claim 6:
    wherein said locator is mounted at a clubhouse;
    a golf cart GPS detector;
    a golf cart transmitter which transmits golf cart GPS
    position coordinates to said locator;
    a golf cart receiver; and
    a clubhouse transmitter which transmits a golf ball position
    and cart position to said golf cart receiver.
11. A system for locating golf balls as in claim 6 wherein
    said locator comprises a display screen, which displays a
    geographical map showing a location of said golf ball and
    said locator.
12. A system for locating golf balls comprising:
    a golf ball containing a transponder; and
    a locator comprising a detector, a transmitter, and a
    microprocessor;
    wherein said transponder amplifies and retransmits said
    signal; and
    wherein said detector detects said retransmitted signal;
    and
    wherein said microprocessor calculates a direction to said
    transponder.
13. A system for locating golf balls as in claim 12 wherein
    said microprocessor determines a distance to said transmitter.
14. A system for locating golf balls as in claim 13 wherein
    said locator determines said distance to said transmitter
    based on a strength of said retransmitted signal.
15. A system for locating golf balls as in claim 12 wherein
    said microprocessor is an application specific integrated
    circuit (ASIC).

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