LIGHT EMITTING GOLF BALL, KIT AND SYSTEM

A light emitting golf ball, light emitting golf ball kit, and a light emitting golf ball system. The light emitting golf ball includes a substantially spherical outer shell manufactured of a material that allows light to pass therethrough. A light assembly is disposed within said outer shell and adapted to produce light that passes through the outer shell. The light assembly includes a light source, a battery, and a magnetic switch that stops a flow of power to from the battery to the light source when in the presence of a magnetic field and allows power to flow from the battery to the light source when the ball is removed from the magnetic field. The kit includes the ball and a ball holder having a magnet attached thereto. The system includes a plurality of balls and a container having at least one magnet.
FIG. 7
LIGHT EMITTING GOLF BALL, KIT AND SYSTEM

CLAIM OF PRIORITY

[0001] This application claims the benefit of priority of U.S. Provisional Patent Application Ser. No. 60/762,390, filed on Jan. 26, 2006.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention
[0003] The present invention relates to golf balls and, more particularly, to a light emitting golf ball adapted for use in the night, which emits light for clear visibility at night, and to kits and systems utilizing such balls.

[0004] 2. Description of the Related Art
[0005] Golf is an extremely popular game that is played throughout the world. Because of the great numbers of people who enjoy playing golf and the limited number of courses in many areas upon which to play, players and golf course owners have looked for ways to increase the number of rounds that could be played on a given course. One such way has been to devise ways to allow players to play golf at night.

[0006] Night golf has heretofore taken two basic forms; night golf with a lighted ball and flagstick and night golf with a lighted course. The first form requires a golf ball that will provide adequate illumination to allow it to be seen while swinging, during flight and between shots, and that will fly in a manner similar to a conventional golf ball. The second form of night golf requires a significant investment in lights on the part of the course owner and requires the owner to incur the continued expense of keeping lights on for extended period of time. For this reason, very few courses have installed such lighting. Further, for those courses that have installed lights, these lights often cast odd shadows and seldom extend into the rough, causing golfers to inaccurately estimate the direction and amount of flight of the golf ball and, consequently, to lose balls that would otherwise be found were there sufficient light to do so. Thus, many night golfers on lighted courses utilize light emitting golf balls in order to avoid the time and expense associated with unsuccessfully searching for golf balls during their round. Finally, golfers who play in the evening and need to finish their round during twilight hours may also utilize light emitting golf balls for the same reasons.

[0007] A number of light-emitting golf balls have been developed and utilized in the past. One of the first such balls was manufactured of a solid, substantially transparent material having a bore through its center into which a miniature chemical luminescent light stick was inserted. These balls allowed users to see the balls at night, even when hit into the rough. However, the light sticks were either prone to ejection from the bores when excessive spin was placed on the balls, causing the balls to be lost, or were difficult to eject in order to replace the light sticks. Further, the light sticks are affected by the ambient temperature and humidity at the time of play, which impacts the light intensity and duration of light.

[0008] Recently, a number of other light-emitting golf balls have been developed. Some of these balls employ a chemical luminescent material in the core of the ball, which is activated upon contact between the ball and golf club, in much the same manner as “cracking” a chemical luminescent light stick. These golf balls overcome the problem of lost light sticks, as there is no light stick to be lost, and also provide brighter and more uniform light dispersion through the ball. Further, because they appear as conventional balls, they may be used as conventional balls after their chemical luminescence has dissipated, although the key purpose of nighttime play is no longer possible after dissipation. However, they suffer from the other problems attendant to chemical luminescence; i.e. the decreasing amount of light provided, the fact that they only remain lighted for a maximum of one round. Further, because the ball needs to be struck with considerable force in order to activate the light, the average golfer might not hit the ball sufficiently hard to activate the light so course professionals would have to activate the lights prior to the start of a tournament. This requirement led to increased costs for the tournament operator from the labor required for activation, relatively low yield for the number of balls that would light and shortened light-life for balls.

[0009] Another recent development in the field of light emitting golf balls has been to install a flashing light within a substantially opaque shell of a multilayered design. One such ball is disclosed in U.S. Pat. No. 6,712,487, which discloses a ball having a light emitting electronic circuit that is activated by an impact sensor and causes the ball to flash on and off for a predetermined period of time. This type of light emitting golf ball overcame the problems attendant to chemical luminescence; i.e. the decreasing amount of light provided, the fact that they only remain lighted for a maximum of one round. However, they are not without their drawbacks.

[0010] First, the flashing of the light in these golf balls proves a distraction to the golfer when attempting to hit the ball. Second, although the timer based off switch allows the batteries to be conserved to the point where the ball may be used for more than one round, this arrangement is detrimental to its function. For example, in instances where it takes a great deal of time to attempt to find a lost ball, the ball may turn off before it is located so the ball is lost in play. Similarly, in instances where slow play by a group in front of the user causes a delay between shots exceeding the predetermined time period, the ball will not be illuminated when the user attempts to hit it. Third, the user has no control as to when to turn the light off as this function is programmed in the electronic circuitry and permanently sealed in the ball. Thus, in cases where these balls are inadvertently illuminated, such as when a user drops the ball in a parking lot, the user has no way of shutting off the light and must waste the battery until the ball automatically shuts off.

[0011] Therefore, there is a need for a light emitting golf ball that users can easily see at night, even when hit into the rough, that provides a substantially continuous level of light for a sustained period of time, that does not need to be struck in order to be illuminated, that is adapted for more than a single use, that has a light source that cannot be removed from the ball through impact from a golf club, that may be adapted to float when hit into water, that does not flash when in use, that does not require the use of expensive impact-controlled electronic circuitry that does not automatically
shut off after a predetermined period of time, and that a user may shut manually shut off when the light is not desired.

SUMMARY OF THE INVENTION

The present invention is a light emitting golf ball, light emitting golf ball kit, and a light emitting golf ball system. In its most basic form the light emitting golf ball includes a substantially spherical outer shell that is sized, and has a dimple pattern on its outer surface, similar to that of conventional golf ball. The outer shell is manufactured of a material that allows light to pass therethrough. A light assembly is disposed within said outer shell and adapted to produce light that passes through the outer shell. The light assembly includes a light source, preferably a light emitting diode (LED), a battery, and a magnetic switch, such as a Hall Effect sensor, that controls a flow of power from the battery to the light source. In the preferred embodiment, the magnetic switch stops the flow of power when it is placed in the presence of a magnetic field and allows power to flow from the battery to the light source when the ball is removed from the magnetic field. However, in some embodiments of the invention the magnetic sensor is a latched sensor, which turns the light source on when a first magnetic field is applied and turns the light source off when a second magnetic field is applied.

The preferred light assembly includes two 3-volt batteries and a printed circuit board to which one LED surface mount type light source, a Hall Effect type magnetic sensor, a resistor and a capacitor are mounted. Depending upon the specific battery, light source and magnetic sensor used, the light assembly may include one or more resistors, transistors and/or capacitors in order to further control the power flowing from the battery to the light source. In the preferred embodiment two cushioning members included, with one being disposed between the printed circuit board and first battery and the other between the first battery and second battery. The cushioning members are preferably a closed cell foam having a thickness of 1.5 millimeters and having adhesive on both sides, such as foam adhesive mounting tape sold by a number of manufacturers. It is likewise preferred that the printed circuit board has a thickness of approximately 1.75 millimeters, which is thicker than conventional boards. The thickening of the board and the provision of cushioning members are preferred, as their inclusion has been shown to increase the durability of the ball and decrease incidents of breakage of the light assembly. It is preferred that the light assembly be arranged and disposed within the outer shell such that the center of gravity of the ball is at the geometric center of the ball. This is preferred in order to ensure that the that the ball will fly and roll in a uniform, true, manner, and to ensure that the performance of the ball, in terms of driving distance and roll, is comparable to a conventional golf ball.

In some embodiments, the light emitting golf ball is adapted to allow the ball to float on water. In these embodiments, the light assembly is preferably encapsulated within an epoxy material, preferably Locite Superflex® Non-Corrosive RTV distributed by the Henkel Corporation of Irvine, Calif., and the outer shell is a preferably manufactured of a substantially transparent urethane or nylon, which has a milky white color, which is molded around the light assembly. In some embodiments, a photosensitive dye, such as fluorescein, is dispersed within the outer shell of the light emitting golf ball, or within a lens disposed over the light source. The use of a fluorescein dye causes the light generated by the light source to excite the dye, effectively illuminating the entire ball substantially evenly rather than appearing as a relatively small point source as the light source would appear in embodiments in which a dye is not used. Further, as fluorescent dyes come in a variety of colors, the illumination provided by such balls may likewise be altered to appear as different colors. This is advantageous as it allows users to readily identify whose ball is whose when playing a round of night golf, or to identify the flight of their ball when taking shots at a night driving range. However, the preferred embodiment utilizes colored LED light sources with and a white dye within the outer shell, which produces a colored light having good dispersion.

In other embodiments, the light emitting golf ball is not adapted to float, but rather is manufactured to substantially conform to requirements set forth by the United States Golf Association (USGA). In these embodiments, the outer shell of the illuminated golf ball is manufactured of multiple layers, in a manner similar to conventional balls, and includes an outer layer manufactured of the material marketed under the trademark SURLYN®, by the E. I. du Pont de Nemours and Company of Wilmington, Del., and an inner core manufactured of clear polyurethane in which the light assembly is encapsulated.

In the preferred embodiment of the light emitting golf ball, the light assembly is disposed within an inner shell and encapsulated therein by a core material. It is preferred that the inner shell be manufactured of a polycarbonate material that includes at least two centering pins extending therefrom for centering the light assembly within a mold while the remainder of the ball is manufactured. The preferred inner shell includes five centering pins, with one pin extending in the north and south direction, when the ball is viewed as a globe, and the other three centering pins extending from the equator at equal distances from one another. The preferred core material is a Locite Hysol® E-30CL adhesive, distributed by the Henkel Corporation of Irvine, Calif., which is a resilient epoxy material that encapsulates the light assembly and does not fracture when the ball is struck by a golf club.

In its most basic form, the light emitting golf ball kit of the present invention includes at least one light emitting golf ball, and a ball holder in which the balls may be stored when not in use. The kit of the present invention is intended to allow users of the balls to de-energize the balls when not in use, and to allow sellers of small quantities of the balls to keep the balls in a de-energized position until they are sold.

The ball holder of the kit of the present invention is dimensioned to accommodate at least one golf ball and includes at least one magnet that is disposed within or upon the ball holder in proximity to at least one golf ball stored within the ball holder so as to create a magnetic field of sufficient strength to activate the magnetic switch within the golf ball and stop the flow of power from the battery to the light source when the ball is disposed within the ball holder.

In some embodiments, the ball holder is merely a cardboard sleeve style box, such as those used to store new conventional golf balls, having separate magnets adhered to the inside surface of the box at locations corresponding to the locations of the balls stored within. Such a box will typically be adapted to accommodate from one to four golf balls and will include a corresponding number of magnets.
In other embodiments in which the ball holder is a cardboard sleeve style box, a single strip of magnetic material is disposed within the box between its inside surface and the golf balls. Such a strip magnet may be adhered to the box, or may merely float within the closed box during shipping.

In other embodiments, the ball holder takes the form of a sleeve having an attachment, such as a clip or strap, which allows the ball holder to be attached to a golf bag or user’s clothing. Such embodiments are similar to the sleeve style boxes insofar as they may include one magnet, or multiple magnets, and may be adapted to hold one ball, or a plurality of balls. Further, it is preferred that such sleeves be designed in such a way as to maintain the balls in place when not in use while allowing the balls to be easily removed when the user wishes to use them.

In other embodiments, the ball holder takes the form of a flexible box having a magnet disposed along one sidewall and an integral top to which a magnet is disposed in a location to allow it to mate with the sidewall mounted magnet. In such embodiments, it is preferred that the sidewall magnet and the top magnet create a magnetic field of such a strength that a single magnet will not trigger the Hall Effect type magnetic sensor within the golf ball, but that the combined field generated by both magnets is sufficient to trigger the sensor. This is preferred as it allows the ball to be illuminated as soon as the top is raised, aiding the user in locating and removing the ball therefrom. These embodiments of the ball holder also include an attachment such as a clip or strap, which allows the ball holder to be attached to a golf bag or user’s clothing.

In other embodiments, the ball holder takes the form of a ball clip, having a design similar to ball clips utilized by tennis players. The preferred ball clip is designed to hold one golf ball and includes a cup portion dimensioned to accommodate a golf ball, and a spring member, which is designed and dimensioned to exert a downward force on the ball to capture it between the cup and the spring member. Like the sleeve described above, the preferred ball holder includes an attachment, such as a clip or strap, which allows the ball holder to be attached to a golf bag or user’s clothing. The preferred ball holder includes a magnet disposed within or upon the spring member, but the magnet may also be disposed within or upon the cup to achieve similar results.

In still other embodiments, the ball holder takes the form of an open cup In the embodiment of the kit 50 shown in FIG. 5B, the ball holder 51 is an open cup type holder that holds the ball in place through a frictional interference fit. The cup takes the form of a sphere having an inside surface that is dimensioned to accommodate the ball and an opening defined by a top edge that is parallel to a plane formed by the centerline of the ball such that the cup is slightly larger than a hemisphere. The cup is formed of a resilient material that deforms slightly to allow the ball to be inserted therein and returns to its original position to hold the ball against the inside surface thereof. A base is formed integral to the cup and includes a magnet disposed therein. Finally, an attachment is included to allow it to be attached to a user’s clothing or golf bag.

The light emitting golf ball system of the present invention includes a plurality of light emitting golf balls and a container for storing the balls when not in use. In embodiments of the system adapted specifically for shipping large quantities of balls, the preferred container takes a form similar to a standard egg crate insofar as it has a number of compartments each dimensioned to accommodate a single golf ball. In some such embodiments, each compartment has a separate magnet attached to, or disposed within, its bottom. In other such embodiments, a sheet of magnetic material is placed over the top of the golf balls within the container. Such a sheet may be attached to the bottom surface of a container top or, when multiple containers are being shipped in the same box, may be attached to, or formed as part of, a sheet style divider disposed between containers.

In embodiments in which the balls are to be stored by a golf course or driving range owner, the container takes the form of a rectangular box having a magnetized bottom surface. In such embodiments, the balls are placed in the container such they form a single layer in the bottom thereof, allowing the magnetized bottom surface to de-energize the balls until they are removed therefrom. Such container are preferably sized to accommodate a similar number of golf balls to those held in conventional range buckets and include a handle for carrying the container to a driving range, and a cover for ensuring that the golf balls remain in the container during transport.

Therefore, it is an aspect of the invention to provide a light emitting golf ball that users can easily see at night, even when hit into the rough.

It is a further aspect of the invention to provide a light emitting golf ball that provides a substantially continuous level of light for a sustained period of time.

It is a further aspect of the invention to provide a light emitting golf ball that does not need to be struck in order to be illuminated.

It is a further aspect of the invention to provide a light emitting golf ball that is adapted for more than a single use.

It is a further aspect of the invention to provide a light emitting golf ball that has a light source that cannot be removed from the ball through impact from a golf club.

It is a further aspect of the invention to provide a light emitting golf ball that may be adapted to float when hit into water.

It is a further aspect of the invention to provide a light emitting golf ball that does not flash when in use.

It is a further aspect of the invention to provide a light emitting golf ball that does not require the use of expensive impact sensor controlled electronic circuitry.

It is a further aspect of the invention to provide a light emitting golf ball that does not automatically shut off after a predetermined period of time.

It is a still further aspect of the invention to provide a light emitting golf ball that a user may shut manually shut off when the light is not desired.

These aspects of the invention are not meant to be exclusive and other features, aspects, and advantages of the present invention will be readily apparent to those of ordinary skill in the art when read in conjunction with the following description, and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cut away side view of an embodiment of the light emitting golf ball that is adapted to float.

FIG. 2 is a cut away side view of the preferred embodiment of the light emitting golf ball.

FIG. 3A is a side view of one embodiment of the kit of the present invention in which the ball holder is a box.
and in which the side of the box is cut away to show the relationship between the box, magnets and three balls.

[0041] FIG. 3B is a side view of the preferred embodiment of the kit of the present invention in which the ball holder is a box and in which the side of the box is cut away to show the relationship between the box, magnet, partition, and two balls.

[0042] FIG. 4A is a side view of another embodiment of the kit of the present invention in which the ball holder is a sleeve and in which the side of the box is cut away to show the relationship between the sleeve, magnet and balls.

[0043] FIG. 4B is a side view of another embodiment of the kit of the present invention in which the ball holder is a box and in which the side of the box is cut away to show the relationship between the box, magnet, and two balls.

[0044] FIG. 4C is a cut away side view of still another embodiment of the kit of the present invention in which the ball holder is a flexible box having a top secured to a body by a magnetic closure.

[0045] FIG. 5A is a cut away side view of one embodiment of the kit of the present invention in which the ball holder is a ball clip and in which the cup of the ball clip is cut away to show the relationship between the cup, magnet and ball.

[0046] FIG. 5B is a cut away side view of another embodiment of the kit of the present invention in which the ball holder is an open cup style ball holder and in which the cup of the ball clip is cut away to show the relationship between the cup, magnet and ball.

[0047] FIG. 6A is a top view of one embodiment of the system adapted for shipping and/or multiple golf balls.

[0048] FIG. 6B is a side view of the embodiment of FIG. 6A with the side cut away along line A-A to show the relationship between the compartments, magnets and balls.

[0049] FIG. 7 is a side view of another embodiment of the system of the present invention adapted for shipping and/or storing multiple balls in stacked relationship with the side cut away to show the relationship between the compartments, magnetic sheets and balls.

[0050] FIG. 8 is a side view of another embodiment of the system of the present invention with the side cut away to show the relationship between the container bottom, magnetic sheet and balls.

[0051] FIG. 9A is a top view of the preferred embodiment of the present invention with the side cut away to show the relationship between the container, dividers, magnets and balls.

[0052] FIG. 9B is a side view of the embodiment of FIG. 9A with the side cut away along line A-A to show the relationship between the container, dividers, magnets and balls.

**DETAILED DESCRIPTION OF THE INVENTION**

[0053] A light assembly 20 is disposed within said outer shell 12 and is adapted to produce light that passes through the outer shell 12. The light assembly 20 includes a light source 22, a battery 24, and a PC Board with a magnetic switch 26 that controls the flow of power from the battery 24 to the light source 22. In some embodiments, this magnetic is a latched type switch in which the application of a magnetic field thereto causes the switch to toggle between on and off state. These embodiments have distinct advantages, as a user would need only wave a magnet over the ball to activate it deactivate it. However, because presently available versions of these switches must remain in a semi-active mode at all times, they draw too much current to be provide sufficient battery life. The preferred magnetic switch 26 is designed to stop the flow of power when in the presence of a magnetic field and allows power to flow from the battery 24 to the light source 22 when the ball is removed from the magnetic field. This design is preferred as the magnetic switch 26 does not draw a significant amount of power from the battery 24 when in a resting state and, accordingly, does not adversely impact the shelf life of the golf ball 10.

[0054] In the embodiment of FIG. 1, the light source 22 and magnetic switch are surface mounted devices that are mounted to a small printed circuit board 28. In this embodiment, the light source 22 is preferably a surface mounted LED having a 0603 size and adapted to run at a range of between 2.5 and 4.8 volts, the magnetic switch 26 is preferably a surface mounted Hall Effect sensor of a type similar to that sold under model number 3211 by Allegro Microsystems of Worcester, Mass. The battery 24 is preferably a Maxell CR2032 three volt battery, which is preferred for the connection between battery and wire. However, six volt button style batteries of a type CR1632, AG10 or AG13, which are produced by a number of manufacturers, or a button style lithium ion battery, such as those sold under model number KCR2016 and KCR2032 by the Eastman Kodak Company of Rochester, N.Y., may be substituted to achieve similar results. Although surface mounted components are preferred, through-hole mounted components, such as a 5 mm through-hole mounted LED, may be substituted to achieve similar results. Further, depending upon the specific battery 24, light source 22 and magnetic sensor 26 used, the light assembly 20 may also include one or more resistors and/or capacitors (not shown) mounted to the printed circuit board 28 in order to further control the power flowing from the battery 24 to the light source 22.
The light assembly 20 of the embodiment of FIG. 1 also includes a hollow plastic ring 30 into which the battery 24 is mounted, preferably by press fitting. The ring 30 is included in order to balance the weight of the ball 10 such that the center of gravity of the ball remains at the geometric center of the ball 10 and to lower the specific gravity of the ball 10 to allow it to float on water. The ring 30 is preferably filled with Loctite HY-SOL® adhesive and mounted around the battery 24 in order to reduce the effects of impact on the remainder of the light assembly 20. However, in other embodiments, the ring 30 may be disposed at other locations within the outer shell 12. Finally, in the preferred embodiment of the floating version of light emitting golf ball 10, the ring 30 is eliminated, the light assembly is encapsulated in Loctite Superflex® Non-Corrosive RTV, distributed by the Henkel Corporation of Irvine, Calif., and the material used to form the outer shell 12 is formulated to adjust the density of the ball 10 to be less than that of water.

It is preferred that the embodiment of the ball 10 of FIG. 1 be formed by injection molding the outer shell 12 around the light assembly 20 such that the light assembly 20 is encapsulated within the outer shell 12. It is preferred that the light assembly 20 be arranged and disposed within the outer shell 12 such that the center of gravity of the ball 10 is at the geometric center of the ball 10. This is preferred in order to ensure that the that the ball 10 will fly and roll in a uniform, true, manner, and to ensure that the performance of the ball 10, in terms of driving distance and roll, is comparable to a conventional golf ball. Therefore, the light assembly 20 is preferably precisely located within the mold during forming.

Referring now to FIG. 2, the preferred embodiment of the light emitting golf ball 10 is shown. This embodiment is not adapted to float, but rather is manufactured to substantially conform to requirements set forth by the United States Golf Association (USGA). As shown in FIG. 2, the outer shell 12 of the light emitting golf ball is manufactured of multiple layers 40, 42, 44 in a manner similar to conventional balls. The outer layer 40 is manufactured of the material marketed under the trademark SURLYN®, by the E. I. du Pont de Nemours and Company of Wilmington, Del. This material is a substantially opaque material that tends to glow when illuminated from within and may be dyed to appear in many colors. Accordingly, embodiments in which a SURLYN® outer layer are utilized will typically not include a photosensitive dye dispersed within the outer shell 12. The inner layer 42 of the outer shell 14 of the ball 10 is preferably manufactured of a polyurethane material.

As shown in FIG. 2, the light assembly 20 is preferably disposed within an inner shell 32, preferably manufactured of a polycarbonate material. The preferred inner shell 32 includes at least two, and preferably five, centering pins 36 extending from its outer surface. The centering pins 36 are used to center the inner shell 32 and light assembly 20 when they are molded within the inner layer 42 of the outer shell 14 during manufacturing. However, the centering pins are eliminated in other embodiments, and the inner shell 32 is centered using retractive die pins.

In the embodiment of FIG. 2, the light assembly 12 includes two batteries 24, two foam cushioning members 23, and a printed circuit board 28 to which one light source 22, one magnetic switch 26, a resistor (not shown) and a capacitor (not shown). One cushioning member 23 is disposed between the printed circuit board 28 and first battery 24 and the other between the first battery 24 and second battery 24. The cushioning members 23 are preferably a close cell foam having a thickness of 1.5 millimeters and having adhesive on both sides, such as foam adhesive mounting tape sold by a number of manufacturers. It is likewise preferred that the printed circuit board 28 has a thickness of approximately 1.75 millimeters, which is thicker than conventional boards. The thickening of the printed circuit board 28 and the provision of cushioning members 23 are preferred, as their inclusion has been shown to increase the durability of the ball and decrease incidents of breakage of the light assembly. In order to further increase the durability of the ball 10, the preferred light assembly 20 is encapsulated within the inner shell 32 by a core material 44. The inner shell 32 is filled with a core material 44 that encapsulates the light assembly 20 therein. The preferred core material 44 is a clear epoxy material, such as Loctite Hyso® E-30CL, distributed by the Henkel Corporation of Irvine, Calif., that is sufficiently resilient so as not to fracture when the light emitting golf ball 10 is struck by a golf club. However, other materials, such as urethanes, clear plastics or the like, may be substituted to achieve similar results.

The embodiment of FIG. 2 is also sufficiently balanced to allow the hollow plastic ring 30 of FIG. 1 to be omitted. Consequently, the light assembly 20 includes only the batteries 24, light source 22 and magnetic switch 26. However, it is recognized that the ring 30 may likewise be included in this embodiment, that weights may be added or voids formed within the outer shell 12 of the ball 10 in order to align its center of gravity with its geometric center.

As shown in FIG. 3A, one embodiment of the light emitting golf ball kit 50 of the present invention includes a plurality of balls 10 disposed within a ball holder 51, here a cardboard sleeve style box 52, such as those used to store new conventional golf balls. In the embodiment of FIG. 3A, three balls 10 are shown, but it is recognized that such boxes 52 may hold two balls 10, such as in FIG. 3B, or one, three, four, or more balls 10. The embodiment of FIG. 3A includes three separate magnets 54 adhered to the inside surface 56 of the box at locations corresponding to the locations of the balls 10 stored within. However, in other embodiments, a single strip of magnetic material, such as the strip 60 shown in FIGS. 4A and 4B, may be substituted to achieve similar results. Such a strip 60 may be adhered to the box, or may merely float within the closed box during shipping. It is noted that commonly available strip magnets have been found to not create a strong enough magnetic field to trigger the preferred magnetic switch 26 and, therefore, the use of button style rare earth magnets, configured as shown in other figures herein, is preferred.

FIG. 3B shows the preferred version of the kit 50, in which the ball holder 51 takes the form of a sleeve 60 dimensioned to accommodate two balls 10 and a single magnet 54. In the embodiment of FIG. 3B, the magnet 54 is embedded within a sheet 53, preferably manufactured of cardboard and disposed perpendicularly between the sides of the ball holder 51 between the balls, where the sheet 53 acts as a divider. This version of the system 50 is preferred as it reduces the number of magnets that must be used and maintains the magnet a sufficient distance from the side of the ball holder 51 to prevent magnetic field from interfering.
with the fields generated by magnets in adjacent ball holders, which can occur when two magnets are in sufficiently close proximity to one another.

[0063] FIGS. 4A and 4B show other embodiments of the kit 50 in which the ball holder 51 takes the form of a sleeve 60 dimensioned to accommodate one or more balls 10 and one or more magnets 54. The sleeves 60 of FIGS. 4A and 4B include an attachment, here clip 62, joined thereto, which allows the ball holder 51 to be attached to a golf bag or user’s clothing. A strip magnet 54 is disposed within the sleeve 60. However, one magnet 54 or multiple magnets 54 may be used. The magnet 54 may be aligned with the side of the ball holder 51, as shown in FIG. 4A, or may be disposed as a divider between balls 10, as shown in FIG. 4B.

[0064] It is preferred that such sleeves 60 be designed in such a way as to maintain the balls in place when not in use while allowing the balls to be easily removed when the user wishes to use them. As shown in FIGS. 4A and 4B, this is accomplished by including a sealing cover 64 at the top of the sleeve 60 and by rotationally mounting the clip 62 to the sleeve 60 in a manner similar to those utilized on many conventional cellular telephone belt clips. This allows the top 64 to be removed from the sleeve 60 and rotated downward to eject a ball 10 therefrom when a user so desires. However, it is recognized that a number of different means may be utilized to achieve this function and that this is but one example.

[0065] FIG. 4C shows the preferred embodiment of the kit 50. In the preferred embodiment, the ball holder 51 takes the form of flexible box 61 dimensioned to accommodate a single ball 10. The flexible box 61 is formed from leather, neoprene or other material that is both durable and flexible, and includes an integral top 63, which rotates about seam 65 and is dimensioned to cover the open top of the box 61 once the ball 10 is disposed therein. The preferred top 63 includes a magnet 54 that is dimensioned to mate with another magnet 54 disposed within the side of the box 61, which cases the top 63 to automatically stay closed because of the attraction between the magnets 54. In such embodiments, it is preferred that the magnet 54 and the magnet 54 in the top 63 create a magnetic field of such a strength that a single magnet will not trigger the Hall Effect type magnetic sensor within the golf ball 10, but that the combined field generated by both magnets 54 or the sensor 84, if preferred as it allows the ball 10 to be illuminated as soon as the top 63 is raised, aiding the user in locating and removing the ball therefrom. However, other embodiments utilize a single magnet 54 disposed in another location about the box 63 and a separate mechanical fastening means, such as snaps or hook and loop fasteners, to secure the top 63 to the side of the box 61.

[0066] As was the case with the embodiments of FIGS. 4A and 4B, the ball holder 51 includes an attachment, such as a clip 62, joined thereto, which allows the ball holder 51 to be attached to a golf bag or user’s clothing. However, other art recognized attachment means may be substituted to achieve similar results. Finally, the preferred ball holder 51 includes openings (not shown) therein to allow the user to know whether the ball 10 has been inadvertently illuminated.

[0067] Another embodiment of the kit 50 is shown in FIG. 5A. In the embodiment of the kit 50 shown in FIG. 5A, the ball holder 51 takes the form of a ball clip 70, having a design similar to ball clips utilized by tennis players. The ball clip 70 of FIG. 5A is designed to hold a single light emitting golf ball 10 and includes a cup portion 72, and a spring member 74, which is designed and dimensioned to exert a downward force on the ball 10 to capture it between the cup 72 and the spring member 74. Like the sleeve 60 described above, the ball holder 51 includes an attachment such as a clip 62 or strap, which allows the ball holder 51 to be attached to a golf bag or user’s clothing. The ball holder 51 of FIG. 5A includes two magnets 54; one disposed within or upon the cup 72 and the other disposed near the spring member 74. However, the preferred ball holder of FIG. 5B includes a single magnet 54 that is preferably disposed near the spring member 74, as such an arrangement eliminates the risk of field interference if multiple clips are used.

[0068] In the embodiment of the kit 50 shown in FIG. 5B, the ball holder 51 is an open cup 75 type holder that holds the ball in place through a frictional interference fit. The cup 75 takes the form of a sphere having an inside surface 77 that is dimensioned to accommodate the ball 10 and an opening defined by a top edge 79 that is parallel to a plane formed by the centerline CL of the ball 10 such that the cup is slightly larger than a hemisphere. The cup 75 is formed of a resilient material that deforms slightly to allow the ball 10 to be inserted therein and returns to its original position to hold the ball 10 against the inside surface 77 thereof. A base 81 is formed integral to the cup 75 and includes a magnet 54 disposed therein. The magnet 54 is preferably disposed within the base 81 during the forming process, but may be mechanically attached in other embodiments. Finally, the embodiment of FIG. 5B includes a female button type fastener portion 83 for attachment to a mating male type fastener portion (not shown). However, this is for illustrative purposes and other art recognized attachment means, including those disclosed herein, may be substituted to achieve similar results.

[0069] Referring now to FIGS. 6A and 6B, one embodiment of the light emitting golf ball system 80 of the present invention is shown. The system 80 includes a plurality of light emitting golf balls 10 and a container 82 for storing the balls 10 when not in use. In the embodiment of FIGS. 6A and 6B, the container 82 takes a form similar to a standard egg crate insofar as it has a number of compartments 84 each dimensioned to accommodate a single golf ball 10. A separate magnet 54 is disposed in the spaces between each set of four balls 10. These magnets 54 are of a type that is sufficient to generate a magnetic field of adequate strength to trigger the magnetic switches of each of the four balls in which it is in proximity. However, in other embodiments, magnets 54 are attached to the bottom of each compartment 84, or are embedded beneath the compartment. In still others, such as the embodiment of FIG. 7, a sheet of magnetic material may be placed over the top of the golf balls 10 within the container 10. In FIGS. 6A and 6B, the compartments 84 and balls 10 are spaced apart a significant distance from one another. However, it is noted that this spacing is primarily for illustrative purposes and that the preferred container 82 will have compartments 84 spaced closely together such that each ball 10 almost touches adjacent balls 10.

[0070] As shown in FIG. 7, the system 80 is readily adapted for shipping large quantities of light emitting golf balls 10. In such embodiments, multiple containers 82 are preferably disposed sandwich style, with a single sheet 86 separating the balls 10 disposed within two containers 80.
Although the sheet 86 depicted in FIG. 7 is a sheet of magnetic material, the preferred sheet 86 is of the type shown in FIGS. 9A and 9B. This arrangement avoids the problem of magnets 54 canceling one another out and, because the relatively high cost of each sheet 86, greatly reduces the overall packaging cost. Although not shown in FIG. 7, the stacked systems 80 will be placed into a shipping box for shipment in a de-energized position.

[0071] Referring now to FIG. 8, another embodiment of the system 80 is shown. This embodiment of the system includes a container 82 that does not have compartments 84, as in the embodiments of FIGS. 6A, 63 and 7, but rather presents as a box having a bottom 88, four sides 92 and an open top that may or may not include a cover 96. A sheet 86 of magnetic material is disposed upon, or formed as part of, the bottom 88 of the container and a single layer of balls 10 may be disposed thereon. As shown in FIG. 8, the container 82 includes a handle 94 for ease of carrying. However, this handle is omitted in many embodiments. Further, although separate compartments are not provided for each ball, is recognized that such compartments could be provided, with the magnetic sheet 86 disposed in the cover 96 or merely placed on the top of each of the balls 10.

[0072] Referring now to FIGS. 9A and 9B, the preferred embodiment of the system is shown. In this embodiment, the system 80 includes a plurality of light emitting golf balls 10 and a container 82 for storing the balls 10 when not in use, in a manner similar to that shown in FIGS. 6A and 6B. However, instead of the container 82 taking a form similar to a standard egg crate, the container takes the form of a box in which dividers 110 are disposed. The dividers 110 define a number of compartments 84, each dimensioned to accommodate a single golf ball 10. A separate magnet 54 is disposed in the spaces between each set of two adjacent balls 10. The magnets 54 are preferably rare earth magnets embedded within a plurality dividers in a manner similar to that described with reference to FIG. 3B.

[0073] Finally, it is noted that in some such embodiments, the sides 92 are extended upward, the handle 94 and top 96 omitted, and multiple layers of balls 10 stacked therein in a manner similar to that shown in FIG. 7, with one sheet 86 of magnetic material disposed between each layer, or every other layer, of light emitting golf balls 10, or as in FIGS. 9A and 9B.

[0074] Although the present invention has been described in considerable detail with reference to certain preferred versions thereof, other versions would be readily apparent to those of ordinary skill in the art. Therefore, the spirit and scope of the claims should not be limited to the description of the preferred versions contained herein.

What is claimed is:

1. A light emitting golf ball comprising:
a substantially spherical outer shell, wherein said outer shell is manufactured of a material that allows light to pass therethrough; and
a light assembly is disposed within said outer shell and adapted to produce light that passes through said outer shell;
wherin said light assembly comprises a light source, a battery in electrical communication with said light source, and a magnetic switch in electrical communication with said battery and said light source; and
wherin said magnetic switch is adapted to control a flow of power from said battery to said light source.

2. The light emitting golf ball as claimed in claim 1 wherein said light source of said light assembly comprises one light emitting diode; wherein said battery comprises one or two batteries, wherein said magnetic switch of said light assembly comprises a Hall effect sensor that stops a flow of power from said batteries to said light emitting diodes when disposed within a magnetic field and to allow power to flow from said batteries to said light emitting diodes when removed from said magnetic field; and wherein said light assembly further comprises a printed circuit board and wherein said light emitting diode and said Hall effect sensor are surface mounted upon said printed circuit board.

3. The light emitting golf ball as claimed in claim 1 wherein said light assembly is arranged and disposed within said outer shell such that a center of gravity of said light emitting ball is at a geometric center of said light emitting golf ball.

4. The light emitting golf ball as claimed in claim 3 wherein said light assembly is disposed within an inner shell; wherein said inner shell comprises at least two centering pins extending therefrom; and wherein said inner shell is filled with a core material that encapsulates said light assembly therein.

5. The light emitting golf ball as claimed in claim 4 wherein said inner shell is manufactured of a polycarbonate material and wherein said core material comprises a resilient epoxy material.

6. The light emitting golf ball as claimed in claim 1 wherein said light emitting golf ball is manufactured so as to have a specific gravity different from a specific gravity of water.

7. The light emitting golf ball as claimed in claim 1 wherein a photosensitive dye is dispersed within said outer shell of said light emitting golf ball.

8. A light emitting golf ball kit comprising:
a light emitting golf ball comprising:
a substantially spherical outer shell, wherein said outer shell is manufactured of a material that allows light to pass therethrough; and
a light assembly is disposed within said outer shell and adapted to produce light that passes through said outer shell;
wherin said light assembly comprises a light source, a battery in electrical communication with said light source, and a magnetic switch in electrical communication with said battery and said light source; and
wherin said magnetic switch is adapted to control a flow of power from said battery to said light source when disposed within a magnetic field and to allow power to flow from said battery to said light source when removed from said magnetic field; and
a ball holder dimensioned to accommodate at least one light emitting golf ball therein;
wherin said ball holder comprises at least one magnet; and
wherin said at least one magnet is disposed in proximity to said at least one light emitting golf ball stored within said ball holder so as to create a magnetic field of sufficient strength to activate said magnetic switch within said light emitting golf ball and stop a flow of power from said battery to said light source when said light emitting golf ball is disposed within said ball holder.
9. The kit as claimed in claim 8 wherein said ball holder comprises a sleeve dimensioned to accommodate at least one light emitting golf ball.

10. The kit as claimed in claim 9 wherein said ball holder comprises a separate magnet for each of said at least one light emitting golf ball.

11. The kit as claimed in claim 9 wherein said ball holder comprises a single magnet that exerts a magnetic field over each of said at least one light emitting golf ball.

12. The kit as claimed in claim 9 wherein said sleeve comprises a removable attachment dimensioned to allow said sleeve to be attached to an item of apparel.

13. The kit as claimed in claim 8 wherein said ball holder comprises a ball clip dimensioned to accommodate a single light emitting golf ball.

14. The kit as claimed in claim 13 wherein said ball clip comprises a cup portion dimensioned to accommodate said light emitting golf ball, a spring member designed and dimensioned to exert a downward force on said light emitting golf ball between said cup and said spring member, and a removable attachment dimensioned to allow said ball clip to be attached to an item of apparel.

15. A light emitting golf ball system comprising:
   a plurality of light emitting golf balls, wherein each of said light emitting golf balls comprises:
   a substantially spherical outer shell, wherein said outer shell is manufactured of a material that allows light to pass therethrough; and
   a light assembly is disposed within said outer shell and adapted to produce light that passes through said outer shell;
   wherein said light assembly comprises a light source, a battery in electrical communication with said light source, and a magnetic switch in electrical communication with said battery and said light source; and
   wherein said magnetic switch is adapted to stop a flow of power from said battery to said light source when disposed within a magnetic field and to allow power to flow from said battery to said light source when removed from said magnetic field; and
   a container for storing said plurality of light emitting golf balls when said light emitting golf balls are not in use;
   wherein said container comprises at least one magnet; and
   wherein said at least one magnet is disposed in proximity to said plurality of light emitting golf balls stored within said container so as to create a magnetic field of sufficient strength to activate said magnetic switches within said plurality of light emitting golf balls when said plurality of light emitting golf balls are disposed within said container.

16. The light emitting golf ball system as claimed in claim 15 wherein said container comprises a plurality of compartments, wherein each of said plurality of compartments is dimensioned to accommodate a single golf ball.

17. The light emitting golf ball system as claimed in claim 16 wherein container comprises a separate magnet for each of said plurality of compartments.

18. The light emitting golf ball system as claimed in claim 15 wherein said container comprises at least one sheet of magnetic material in contact with at least a portion of said plurality of light emitting golf balls.

19. The light emitting golf ball system as claimed in claim 18 further comprising a plurality of sheets of magnetic material, a plurality of containers and a box within which said plurality of containers are disposed, wherein a plurality of said light emitting golf balls are disposed within each container, and wherein each of said sheets of magnetic material are disposed in communication with said plurality of light emitting golf balls disposed within at least one container.

20. The light emitting golf ball system as claimed in claim 15 wherein said container comprises a substantially rectangular box having a magnetized bottom surface, a rectangular cover dimensioned to fit over a top of said box, and a handle for carrying said container;
   wherein said container is dimensioned to allow said plurality of light emitting golf balls to be placed in said container such they form a single layer in upon said magnetized a bottom thereof, allowing said magnetized bottom surface to de-energize said plurality of light emitting golf balls until they are removed therefrom.

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