ABSTRACT
Shoes having illuminated portions thereof. An e.m.f. source is preferably disposed within a cavity in a platform sole of a shoe, and a light bulb and means for operatively connecting and disconnecting the light bulb from the source of e.m.f. are preferably disposed within a cavity in a transparent heel. The means for operatively connecting and disconnecting the light bulb from the e.m.f. source may include a tilt switch, a three-position manually actuated switch, and a recharging switch when the e.m.f. source is rechargeable.

6 Claims, 8 Drawing Figures
ILLUMINATED SOLES AND HEELS

BACKGROUND AND SUMMARY OF THE INVENTION

The invention relates to shoes with lighted portions thereof, and means for providing selective use of the lighted portions of the shoes. There have been many prior art proposals for providing various lighted portions of shoes — such as those shown in U.S. Pat. Nos. 2,976,622, 2,941,315, 1,597,823, and 1,933,243 — however, none of such prior proposals have been commercially successful. Numerous problems associated with such prior art devices which undoubtedly hindered their commercial viability are the problems of (a) not having a large enough cavity for incorporating a battery without significantly structurally weakening support portions of the shoe, (b) having particular shoe position responsive lighting means that were actually responsive only to the weight of the wearer, (c) having a means for turning on and off the light that was not selective in providing for particular shoe position lighting, and (d) the necessity of disassembling the shoe, with possible destruction thereof or damage thereto, when battery replacement was necessitated.

According to the present invention, all of the above-mentioned problems inherent in prior art devices have been remedied. According to the present invention, means are provided in the sole of the shoe for retaining a source of e.m.f. for energizing lights associated with the shoe, which means provides a large enough area for incorporating almost any type of battery or current source without impairment of the support function of the sole. Also, a mercury or other tilt switch is provided for selectively cutting off or on the shoe lights in response to shoe position, doing away with the necessity of cumbersome, often ineffective weight responsive means, and increasing the variety of shoe positions to which the cutoff or cutout means may be responsive.

Additionally, according to the present invention, a three-position switch is provided for either turning the shoe lights on continuously, or bringing the tilt switch into the circuit, making the shoe lights shoe position responsive. Additionally, a battery recharging means may be provided for allowing power source recharging without the need for disassembling and possibly damaging the shoes. In most prior art devices, such a means would not even be contemplated since the batteries and power sources that, of necessity (i.e., because of space limitations), had to be used were not rechargeable (i.e., dry cells).

Thus, according to the teachings of the present invention, shoes having lighted portions thereof are provided that are improved over the prior art devices for almost any purpose — whether decorative or functional — to which the shoes would be put while, at the same time, the possibilities of light response to various shoe positions are greatly increased.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an exemplary shoe embodying the teachings of the present invention;

FIG. 2 is an exploded view of the shoe illustrated in FIG. 1;

FIGS. 3a and 3b are exemplary circuit diagrams for shoes embodying the teachings of the present invention:

FIG. 4a is a top plan view of an exemplary switch and bulb and mounting means associated therewith for use in the circuit shown in FIG. 3a, and FIG. 4b is a side view of the apparatus shown in FIG. 4a; and

FIGS. 5a and 5b are top and side views respectively of a switch, printed circuit, and associated means for use in the circuit shown in FIG. 3b.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an exemplary lighted shoe according to the teachings of the present invention, which shoe may be worn either for decorative or aesthetic appeal, or for providing a means for illuminating a path on which the wearer is walking, for providing visibility of the wearer when bicycling or walking at night, or for a myriad of other purposes. The shoe 10 may comprise generally a transparent heel portion 12, a platform sole 14, and an upper 16 of any suitable style or construction.

As shown most clearly in FIG. 2, the sole 14 comprises a bottom portion 20 that is adapted to be fastened to the heel 12 and to engage the ground when the shoe 10 is worn, and an insole 22 that is adapted to be sandwiched between the sole 20 and a platform sole 24.

The insole 22 has an opening 26 therein and contacts 28 adjacent thereto, with wires 29 leading from contacts 28 to contacts 30 located above heel 12 when the shoe components are assembled. The platform sole 24 has an opening 25 therein adapted to receive a battery 32 — such as nickel-cadmium battery — or other suitable source of e.m.f. The hole 25 cooperates with the hole 26 in the insole 22, the battery 32 also being received by the hole 26 and having contacts thereon adapted to cooperatively contact with contacts 28 on insole 22. Preferably, the shoe has a covering (not shown) therein to be disposed over the platform 24 and insole 22 to contact the wearer's foot. The covering may be removed and easy access thereby gained to the battery or batteries 32 with the platform 24, and also through apertures 30 — to the electrical components within the heel 12 so that both the battery 32 and other electrical components may be quickly replaced without requiring shoe disassembly.

The heel 12 is preferably formed of a hard transparent material such as acrylic or lucite (sturdy enough to serve as a shoe heel). As shown in FIG. 1, the heel may be formed of layers 17' each of a different color and of various sizes to provide an unusual visual effect. The heel may have a ground-engaging portion 13 at the bottom thereof which portion 13 may be formed of rubber or leather or the like and be adapted to be replaced when worn down. Located within heel 12 may be a cavity 35 adapted to receive various electrical components to be further described, and on the outside front face of the heel 12 preferably is located a plate 36 having a toggle switch actuator 38 and recharge orifice 40 received therein.

As shown most clearly in FIGS. 3a and 4a, the electrical components received by the cavity 35 and plate 36 preferably are a three-Way switch 41 for actuation by toggle actuator 38, a light bulb 42, a tilt switch 47, and a charging switch 49, contacts 31 providing connection between contacts 30 and (e.m.f. source 32) and the rest of the electrical components. Preferably, the three-way switch 41 comprises a moveable contact 43 and stationary contacts 44 and 45, the moveable contact 43 adapted to be moved either into contact
with contacts 44 or 45, or into a center "off" position. When the contact 43 is in engagement with contact 44, the tilt or mercury switch 47 is inserted into the circuit whereby energization of the bulb 42 occurs when the shoe 10 is so positioned that the tilt switch 47 is closed. When the contact 43 engages contact 45, the mercury switch 47 is bypassed and the bulb 42 is constantly energized, the circuit from battery 32 always being complete.

Preferably the tilt switch 47 is a mercury switch that — once it is tilted — will provide for oscillation of the mercury 48 therein back and forth to intermittently make and break the contacts of the switch 47 thereby causing flashing of the light 42 on and off. The mercury will stop oscillating once the shoe remains in a certain orientation for a predetermined amount of time (depending upon the design of the switch 47).

A charging switch 49 is preferably employed in all situations where the e.m.f. source is rechargeable — such as nickel-cadmium battery — thereby eliminating the necessity of taking the shoe apart when the battery wears out, as it necessary with prior art devices which utilize dry cell batteries, or removing the covering of the platform 24 as is possible with the present invention. The charging switch 49 may be of the type having a movable cammable contact 51 normally biased into contact with stationary contact 52 to complete the circuit from battery 32 to the electrical components within heel 12, and another stationary contact 53 for cooperation with a recharge plug 55 for providing a recharging circuit for the battery 32. When the tip portion 57 of the recharge plug 55 is inserted into opening 40 of switch 49, it cams contact 51 out of engagement with contact 52 and, at the same time, completes a contact between contact 43 and contact 51 through any suitable recharging means with which the plug 55 is associated. Upon withdrawal of tip 57 of plug 55 after recharging, the contact 51 will again return to engagement with contact 52.

A modification of the electrical components shown in FIGS. 3a, 4a and 4b is shown in FIGS. 3b, 5a and 5b. In this modification, the charging switch 49 is eliminated, and the contacts 31 for making contact with contacts 30 leading to battery 32 are formed on a printed circuit board 33 which mounts the switch 41, tilt switch 47, and bulb 42. As with the modification of FIGS. 4a and 4b, with this modification the cavity 35 for mounting the electrical components within the heel 12 need not be formed so large that the structural integrity of the heel is impaired, diminishing its ability to perform its support function since the largest component — the e.m.f. source 32 — need not be incorporated therein.

The shoe 10 shown in FIG. 1 is used as follows: After the component parts of the shoe are assembled so that battery 32 operatively engages contacts 28 of insole 22 and contacts 30 of insole 22 engage contacts 31 in heel 12, the wearer may wear the shoe 10 just like any other shoe. The switch 41 will normally be in the middle off position with the bulb 42 inoperative. If it is desired that the bulb 42 constantly be energized, the toggle actuator 38 is moved so that contact 43 comes into engagement with contact 45. If it is desired that the bulb 42 should be energized only when the shoe 10 is in a vertical position or in a horizontal position (depending upon the wiring and orientation of tilt switch 47) or that light 42 flash on and off when the shoe is moved from one orientation and then back in place, toggle 38 is moved so that contact 43 engages contact 44, thereby inserting the tilt switch 47 into the circuit between battery 32 and the bulb 42. After extended use when the battery 32 is worn down, the tip 57 of recharging plug 55 is inserted into opening 40 in heel 12, and the battery 32 is recharged, or the covering for platform 24 and apertures 50 may be removed and the various components readily replaced.

Thus, it can be seen that according to the teachings of the present invention, lighted shoes are provided not requiring that any of the supporting parts thereof be weakened by the formation of a large cavity therein for containing a large number of electrical components, shoes that have selective means for energizing and de-energizing the lights, the means allowing a great deal of versatility in condition responsiveness of the lights, and shoes that need not be disassembled when the e.m.f. source incorporated therewith has been depleted.

While the invention has been shown in what is presently conceived to be the most practical and preferred embodiments, it will be apparent to one of ordinary skill in the art that many modifications may be made thereof within the scope of the invention. For instance, a plurality of bulbs 42 may be provided, located in or on various parts of the shoe such as exteriorly mounted on the toe or sides, or a number of different ones within the heel itself. Also, the switch 41 need not have a toggle actuator therefor, but may be of any suitable type, as may the recharging switch 49. Although a mercury switch has been disclosed for the switch 47, other suitable tilt responsive switches may be utilized; the tilt switch can be arranged with respect to the shoe so that it is adapted to be closed upon any predetermined orientation or orientations of the shoe. Also, the controls for the bulb need not necessarily be mounted on the front of the heel, but may also be mounted at other suitable locations on the shoe 10. Other modifications are also possible, thus the invention is not to be limited to what has been herein illustrated, but is to be accorded the full scope of the appended claims to encompass all equivalent structures and devices.

What is claimed is:
1. A shoe comprising:
   a. a sole,
   b. an upper,
   c. a heel,
   d. a source of e.m.f.,
   e. a light bulb adapted to be operatively connected to said e.m.f. source,
   f. a circuit operatively connecting said source of e.m.f. and said light bulb,
   g. means for selectively connecting and disconnecting said e.m.f. source from said light bulb dependent upon the relative orientation of said shoe, said means including a tilt switch disposed within said circuit operatively connecting said source of e.m.f. and said light bulb, and
   h. means for selectively connecting and disconnecting said tilt switch from said circuit operatively connecting said source of e.m.f. and said light bulb, said means including a manually actuated switch having a first position thereof wherein said tilt switch is inserted in said circuit and a second position thereof wherein said tilt switch is not inserted in said circuit and said source of e.m.f. and said light bulb are disconnected.
2. A shoe as recited in claim 1 further comprising means for allowing continuous operative connection of said e.m.f. source and said light bulb, said means comprising said manually actuated switch, said switch having a third position thereof wherein said tilt switch is not inserted in said circuit but where continuous connection between said e.m.f. source and said light bulb by said circuit is provided.

3. A shoe as recited in claim 1 wherein said heel has a cavity formed therein, and further comprising means for mounting said tilt switch and said manually actuated switch within said heel cavity.

4. A shoe as recited in claim 1 wherein said heel is formed of layers of transparent material, consecutive ones of said layers being of differently colored material.

5. A shoe as recited in claim 1 further comprising means for providing ready removal of said light bulb from said heel through the interior of said shoe upper.

6. A shoe as recited in claim 1 wherein said tilt switch comprises an undamped mercury switch for providing intermittent on and off flashing of said light bulb after initial tilting of said mercury switch.

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