United States Patent

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[54] **ILLUMINABLE BALL WITH A TIME DELAY DEVICE**
7 Claims, 4 Drawing Figs.

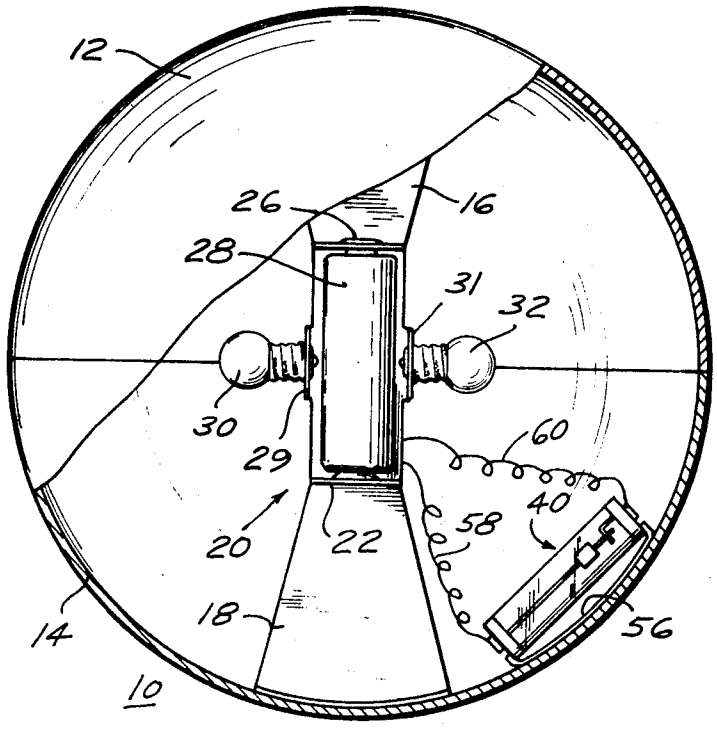
[52] **U.S. Cl.** ..... **240/6.4 R,** 46/228
[51] **Int. Cl.** **F21v 33/00,** A63b 43/06
[50] **Field of Search** ..... 240/6.4 R; 46/228; 272/8 N; 200/61.45

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ABSTRACT: Within the translucent housing of a ball, there is an inertia switch which is connected to a lighting unit. The lighting unit includes a lamp and a battery which can be connected to form a series circuit by a time delay switch. Whenever the normally open inertia switch activates the time delay switch it closes the series circuit for a given period of time.



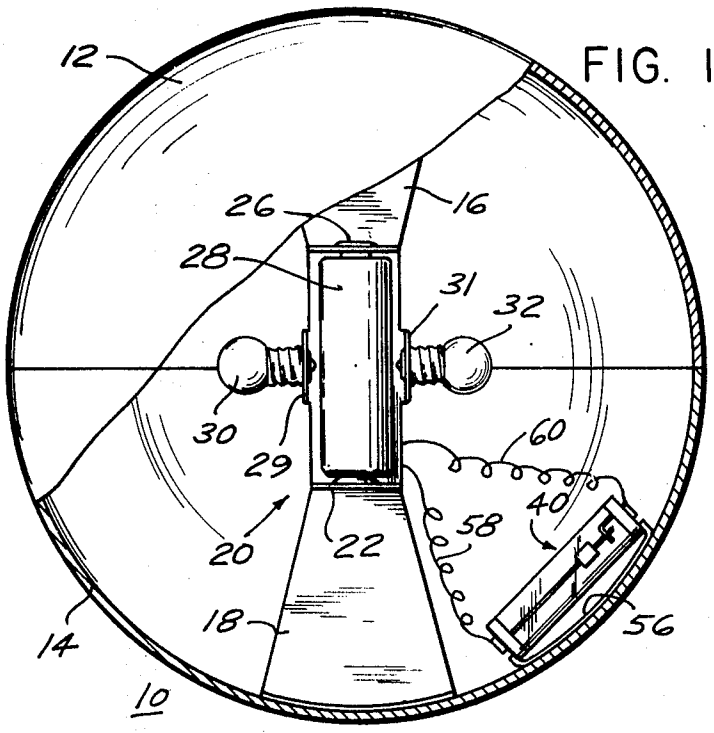


FIG. 1

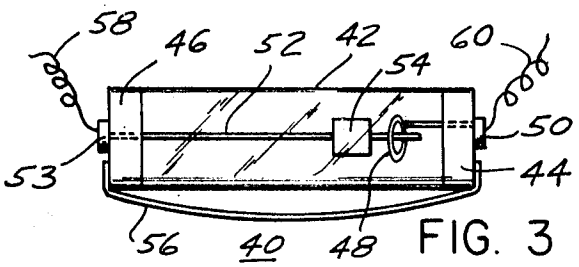


FIG. 3

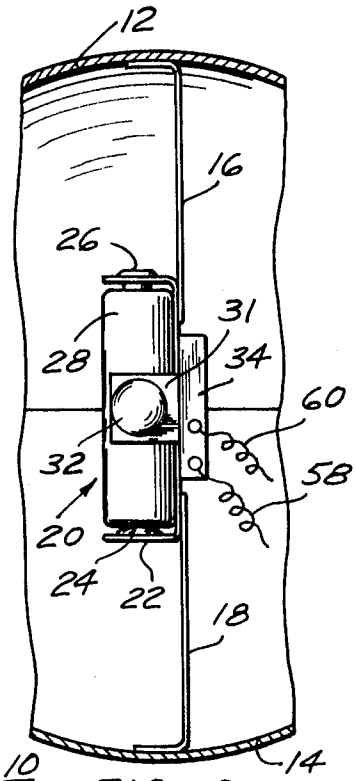


FIG. 2

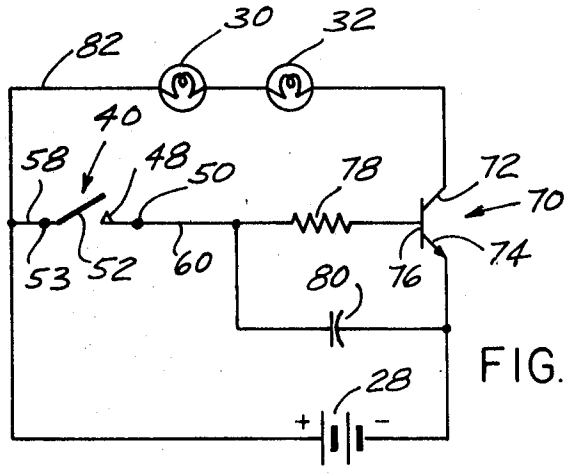


FIG. 4

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ILLUMINABLE BALL WITH A TIME DELAY DEVICE

This invention pertains to illuminable toys and, more particularly, to illuminable balls.

Illuminable balls have been available in the past as toys. Such balls generally fall into two categories. The type employing some sort of toggle switch which is used to manually turn on the lamp within the ball at the start of play and to turn it off at the end of play so that the ball remains continuously illuminated until the player extinguishes the lamp. Thus, electrical energy is consumed only during the period of play. However, such balls are inconvenient because the player must have easy access to the switch. The other type uses an intermittently operated switch which opens and closes in response to the motion of the ball. Such balls are only intermittently illuminated and provide a flickering effect.

It is, accordingly, an object of the invention to provide an illuminable ball which will light up only when being played with and does not require the player to manually operate a toggle switch or the like.

Briefly, the invention contemplates an illuminable ball comprising a housing of material which at least partially transmits light. Within the housing there is an inertia switch which shifts between two states of conductivity. Also, there is within the housing a lighting unit which includes at least one battery and one lamp. A time delay switching means within the housing is responsive to the changes in state of the inertia switch to connect the battery to the lamp for a given period of time each time the inertia switch shifts in a particular way between the states of conductivity.

Other objects, the features and advantages of the invention will be apparent from the following detailed description when read with the accompanying drawing which shows the presently preferred embodiment of the invention.

In the drawings:

FIG. **1** shows a perspective view of an illuminable ball with a portion of the housing broken away;

FIG. **2** is a view similar to that of FIG. **1** but rotated 90° of a portion of the ball;

FIG. **3** is a side view of an inertia switch incorporated in the ball of FIG. **1**; and

FIG. **4** is a schematic diagram of the illuminating circuitry for the ball of FIG. **1**.

In FIGS. **1** and **2** an illuminable ball **10** is shown having a housing comprising two hemispheres **12** and **14** of a high-impact translucent plastic. The hemispheres are preferably provided with mating peripheries (not shown) which permit access to the interior of the ball. The peripheries can be, for example, screw threaded or can be provided with snap-fitting lips. Extending radially inward from the inner walls of the hemispheres are mounting brackets **16** and **18**. One end of each bracket is fixed to the inner surface of one of the hemispheres. The other end of each bracket is fixed to a lighting unit **20**. Lighting unit **20** comprises a chassis **22** with polarized deformations **24** and **26** for engaging battery **28**. Flanges **29** and **31** on the chassis include sockets for supporting lamps **30** and **32**. Chassis **22** also supports a printed circuit card **34** containing electronic elements hereinafter more fully described.

Fixed to the inner surface of hemisphere **12** is inertia switch **40** shown in greater detail in FIG. **3**. Switch **40** comprises spacers **42** to support insulators **44** and **46**. Insulator **44** supports a loop-shaped conductor **48** having a terminal **50** at one end. Insulator **46** supports a resilient rod member **52** having one end passing through the loop of conductor **48** and having a terminal **53** at one end. A mass member **54** is fixed to the other end of the rod member **52**. A contoured support **56** carries the entire switch and provides a contact surface for fixing the switch **40** to hemisphere **12**. Finally, terminals **50** and **53** are connected via wires **60** and **58**, respectively, to printed circuit card **34** of lighting unit **20**.

Printed circuit card **34** supports the electronic elements shown in FIG. **4**. In particular, the electronics comprises a time delay switching circuit centered around transistor **70** having a collector electrode **72** connected to one end of the serial circuit of lamps **30** and **32**, an emitter electrode **74** connected to the negative terminal of battery **28** and a base electrode connected via resistor **78** and wire **60** to terminal **50** of inertia switch **40**. A capacitor **80** connects one end of resistor **78** to the emitter electrode **74**. The positive terminal of battery **28** is connected, via wire **58**, to terminal **53** of inertia switch **40**, and also, via lead **82**, to the other end of the series circuit of lamps **30** and **32**.

The operation of illuminable ball **10** will now be described by making reference to FIGS. **3** and **4**.

Initially, with the ball at rest or not accelerating, inertia switch **40** is open and transistor **70** is nonconducting. Whenever there is an acceleration, rod member **52** at least momentarily contacts loop-shaped conductor **48** closing switch **40**. Charging current flows from the positive terminal of battery **28** via switch **40** to capacitor **80**, raising the voltage of the base electrode **76**. Transistor **70** switches to the conducting state and the following circuit is established: positive terminal of battery **28**, lead **82**, lamps **30** and **32**, transistor **70** to the negative terminal of battery **28**. This circuit is maintained as long as the voltage at the base electrode is sufficiently positive. The required voltage will be present as long as switch **40** is closed. When switch **40** opens, the required voltage will be maintained until the charge on capacitor **80** leaks off via resistor **78** and the base emitter junction of transistor **70**. By making the time constant of the resistor-capacitor combination sufficiently large the transistor will remain conducting for a relatively long time. Thus, any intermittent closure of switch **40** will merely resupply any leaked off charge and transistor **70** will remain conducting until a given period of time after the last opening of switch **40**. Accordingly, as long as the ball is being moved it will remain lighted without any flicker and will only go out when put down.

While only one embodiment of the invention has been shown and described in detail various modification can be made without departing from the spirit of the invention. For example, more than one battery can be used to increase the life of the device before battery replacement is required.

What is claimed is:

1. An illuminable ball comprising: a housing of material which at least partially transmits light; an inertia switch supported within said housing, said inertia switch shifting between first and second states of conductivity in response to the acceleration of the ball; and a lighting unit within said housing and connected to said inertia switch, said lighting unit comprising at least one lamp, at least one battery and a time delay switching means connecting said lamp to said battery, said time delay switching means being energized to close the circuit between said battery and said lamp for at least a given period of time whenever said inertia switch shifts from the first to the second state of conductivity.

2. The illuminable ball of claim **1** wherein said inertia switch comprises a loop of conductive material, a resilient member of conductive material extending through said loop and normally out of contact therewith, and a mass member fixed to said resilient member.

3. The illuminable ball of claim **1** wherein said time delay switching means comprises a transistor and a capacitor.

4. The illuminable ball of claim **1** wherein said time delay switching means comprises a transistor having base, collector and emitter electrodes and a capacitor connected between said base and emitter electrodes.

5. The illuminable ball of claim **4** wherein said lamp, said battery, said emitter and said collector electrodes are connected in series and connecting means which connects said inertia switch means between the junction of said lamp and said battery and the base electrode of said transistor.

6. The illuminable ball means of claim **5** where said connecting means includes a resistor.

7. The illuminable ball of claim **6** wherein said inertia switch comprises a loop of conductive material, a terminal on said loop of conductive material, a resilient member of conductive material extending through said loop and normally out of contact therewith, a terminal on said resilient member, and a mass member fixed to said resilient member, one of said terminals being connected to said junction and the other of said terminals being connected to said base electrode.