ABSTRACT: A timer and lap counter for slot cars and the like consisting of a switch disposed on the raceway on which the slot cars travel for producing an electrical impulse on passage of a slot car. The electrical impulses operate an electrical stepping switch which starts an elapsed time timer and one or a plurality of lap timers associated with each slot car. The stepping switch is also arranged to turn on or off one of a plurality of visual indicators such as lightbulbs for providing a visual display of the lap number travelled by every individual slot car.
TIMER AND LAP COUNTER FOR SLOT CARS

The present invention relates to timers and lap counters for slot cars and the like and more particularly to means for providing a visual display of the total number of laps traveled by a slot car and for providing timing means giving a visual display of the time taken by the slot car to travel one lap as well as the total elapsed time taken by the slot car to travel the total number of laps traveled from the beginning of a race.

In recent years, electric motor driven miniature racing cars, often called "slot" cars or racers, have become increasingly popular. Generally such cars are provided with a pin or guide riding in a slot so as to guide the car along a racetrack and with electrical pickup means sliding along electrical conductors imbedded in the racetrack roadway and adapted to supply electrical power to the car motor. The voltage applied to the car motor is under the control of the car operator and the rate of speed at which the car travels along the race track under the guidance of the slot is directly controlled by the operator by varying the voltage applied to the car motor. In this manner, the car may be started, speeded up, slowed and stopped.

Slot car operators often engage in competitive races, either by running their cars along the racetrack individually while the time taken by the car to travel one or more laps is recorded by means of stop watches, or the like, or by competitively racing several cars against each other parallel to or along the closed loop race track having various curves and hills.

The present invention provides lap-counting means, giving an instantaneous visual indication of the lap number being traveled at a given time by a given car, combined with an elapsed timer providing a visual display of the total time elapsed since the beginning of a race, and in addition, the invention provides for individual lap timers providing visual displays of the time taken by each individual car for traveling each one of a predetermined number of laps.

In view of the foregoing, it is a general object of the invention to provide a substantially simple and low cost timer and lap counter apparatus for slot cars.

It is another object of the invention to provide such timer and lap counter apparatus with simple and effective signal producing means providing an electrical signal upon the passage of a car on a predetermined portion of the racetrack.

It is another object of the invention to provide a timer and lap counter for slot cars giving at all times a visual indication of the total laps traveled by each individual car together with a visual display of the precise time taken by the car to travel each one of a predetermined number of laps, while still providing a further visual display of the total elapsed time taken by each car to travel the total number of laps already traveled, said elapsed time further providing a visual display of the total time taken by each car to run a complete race.

Still a further object of the invention is to provide a timer and lap counter for slot cars which is substantially inexpensive so as to be available to slot car hobbyists, which is easy to maintain, which is simple to manufacture and which is sufficiently precise and adaptable so as to be of use to even the most advanced amateur hobbyist or to the professional establishments where elaborate roadways with a plurality of tracks are available, in consideration of a small fee, to anyone who is interested in the slot car racing hobby.

The foregoing as well as other objects and advantages of the invention will be more clearly understood by reference to the following detailed description taken in conjunction with the accompanying drawings which represent by way of illustrations and examples some of the embodiments of the invention.

In the drawings:

FIG. 1 is a simplified block diagram of an example of an embodiment of a timer and lap counter according to the principles of the invention;

FIG. 2 is a schematic representation of a simple switch for providing an electrical signal upon passage of a car;

FIG. 3 is a partial cross-sectional view along line 3-3 of FIG. 2;

FIG. 4 is a partial view similar to FIG. 2, but showing the switch in a closed position;

FIG. 5 is a schematic representation of another example of switch;

FIG. 6 is a fractional view similar to FIG. 5, but showing the switch being actuated upon passage of a car; and FIG. 7 is another example of signal pickup according to the principles of the invention.

Reffring now to the drawings and more particularly to FIG. 1 thereof, a timer and lap counter apparatus for slot cars, according to the principles of the present invention, comprises an electrical power supply 10, which may be direct current power supply normally used for supplying a direct current voltage to the slot car motors, or which may simply be a source of 110 volt, 60 cycles, voltage. The power supply has a terminal 12 connected to a line 14 which is in turn connectable to a line 16 when switch 18 is depressed or actuated. Line 16 is connected to the inductor, schematically represented at 20, of a stepping switch 22. The return circuit has arbitrarily been chosen to be represented by the ground return, one end of the inductor 20 of the stepping switch 22 being connected to ground and the other terminal 24 of the power supply 10 being also connected to ground. The power supply 10 is provided with a third terminal or tap 26 connected to a line 28 which may be in turn connected to a line 30 when a switch 32 is closed. The stepping switch 22 is provided with two contact wafers shown schematically respectively at 34 and 36. Each wafer is provided with a plurality of regularly disposed fixed contacts, identified I—X with respect to wafer 34 and I'—X' with respect to wafer 36. Wafer 34 has a movable contact 38 and wafer 36 has a movable contact 40 which are displaceable in unison, upon stepping of the switch 22 in the direction of the arrows so as to engage consecutively respectively fixed contacts I—X and I'—X'. Wafer 34 is provided with an input terminal 42 connected to line 30 by means of line 44, and contact wafer 36 has an input terminal 46 connected to line 32 by means of line 48. Output terminals of contacts I—III of wafer 34 are connected in parallel to a common line 48 which is in turn connected to a counter electric motor 50 adapted to drive a lapsed time visual display 52. The terminals of contacts IV—X are connected in parallel by way of a line 54 to line 48 through a switch 56.

In the example of the invention as shown, the terminal of stationary contact I' of contact wafer 36 is connected by way of a line 58 to an incandescent lamp 60. Disposed in parallel with lamp 60 is a counter motor 62 adapted to drive lap timer No. 1 shown at 64, a switch 66 being placed between motor 62 and line 58. In a similar manner, the terminal of stationary contact I' is connected, via line 68, to an incandescent lamp 70, a counter motor 72 adapted to drive a lap timer No. 2, identified by numeral 74, being placed in parallel with the incandescent lamp and being connectable to line 68 by means of switch 76. The terminal of stationary contact III' is also shown connected through a line 78 to a lamp 80, a counter motor 82 adapted to drive lap timer No. 3, 84, being placed in parallel with the lamp and being connectable to line 78 via a switch 86. Each one of the terminals of stationary contacts IV—X' is shown in the drawing as being connected to each of the incandescent lamps 88—100, the current return to ground being effected through a switch 102. It is evident that each of such terminals could also be connected to individual lap timers disposed in parallel with the lamps 88—100. It is obvious that any number of lap timers could thus be provided and that a stepping switch having more than 10 stationary contacts engageable by a movable contact could be used so as to provide any possible practical number of lap counting means and lap timing means. It is also obvious that several stepping switches could be interconnected in the "Christmas Tree" fashion familiar to those skilled in the computer and telephone arts.

One apparatus according to the example of the invention of the schematic of FIG. 1 is adapted to cooperate with each track of a slot raceway, and previously to the start of a race,
switch 32 of each apparatus connected to a track being utilized by a slot car is closed. Switches 66, 76 and 86 would be normally closed unless it is desired to run only a three lap race, in which event switches 56 and 102 would be left open to stop the operation of the apparatus at the end of the third lap. In operation, switch 18, disposed at the starting line of the track roadway, is closed by the passage of a slot car, thus producing an electrical impulse across the inductor 20 of the stepping switch 22. This electrical impulse causes the rotor of the stepping switch, arbitrarily represented in the drawing at 21, to actuate the moveable contacts 38 and 40 of switch wafers 34 and 36 respectively from the off position shown in the drawing to the next position wherein the contacts engage respectively contact I of wafer 34 and contact I’ of wafer 36. As switch 32 has been closed previously to the starting of the car run, terminal 26 of the power supply is now connected to line 30 and to terminal 42 of switch wafer 34 and to terminal 46 of switch wafer 36. As terminals 42 and 46 are respectively electrically connected to movable contact 38 and 40, which are now engaging contacts I and I’, the ellipse motor timer 50 is started and lap timer No. 1, 64, is also started by its motor 62 starting to run. Light bulb 60, in parallel with light lap timer No. 1, is designed generally to light and is provided with a fixed contact 108 and a movable contact 110, normally a small distance away from each other, as shown in FIG. 2. Movable contact 110 is formed on the end of an elongated substantially U-shaped flat spring member 112, the other end of which is affixed to the bottom 108 of slot 104 by any conventional means. One terminal of the switch is connected to line 14 and the other terminal is connected to line 16 of FIG. 1.

A slot car or racer 114 adapted to run on the roadway 102, guided by the slot 104, has a chassis frame, such as shown at 116, on which is affixed a body, such as shown at 118. Chassis 116 supports the road wheels of the car, the front wheels 120 being normally free running and the rear wheels, not shown, being normally driven by an electric motor, now shown. On the front of the chassis frame 116 is pivotally mounted so as to be capable of rotating around an axis substantially perpendicular to the plane of the roadway 102, a combination guide and electrical current pickup 122 according to new well-known principles in the art. Guide 122 has a vertical blade portion 124 normally disposed within slot 104 so as to guide car 114 along the racetrack. Guide 122 is also provided with a horizontal blade portion 126. Below the horizontal blade portion 126 are disposed current pickup braids 128 and 130 for riding along electrical conductors 132 and 134 imbedded in the roadway. The pickup braids 128 and 130 are respectively connected to wires 136 and 138 which supply electrical power to the car motor, not shown. Guide 122 is provided with a vertical pin 140 engaged in an appropriate vertically disposed bore 142 arranged in the front end of the chassis frame 116. In some types of slot car racers, a single fixed pin affixed to the front of the car and engaging the slot is used instead of the guide shown in FIGS. 2—3, but even where such a construction is adopted, the principle of operation of switch 18 remains the same as presently explained.

When car 114 passes over switch 18, the bottom of vertical guide blade 124 engages the top of the flat spring portion 112 of switch 18, as shown in FIG. 4, and thus causes contact 110 to engage contact 108, thus closing the electrical circuit between line 14 and 16.

FIGS. 5—6 represent a modification of the switch arrangement of FIGS. 2—4. In this modification, switch 18 includes a pair of flat spring contacts, as shown at 140 and 142, respectively connected to lines 14 and 16 of FIG. 1, and attached to the bottom of slot 104. Each flat spring contact 140 and 142 has a substantially horizontal portion, as shown respectively at 144 and 146, which nevertheless, forms a slight angle with the plane of the bottom surface 106 of the slot 104. The bottom of the vertical blade portion 124 of guide 122 of car 114, is provided with an elongated electrical current conductive section.
When the car 114 passes over the switch 18, as shown in FIG. 6, the current conductive elongated section 148 disposed at the bottom of the guide vertical blade 124 engages the upper faces of the substantially horizontal portions 144 and 146 of respectively resilient contacts 140 and 142, urging them slightly downward and thus closing the electrical circuit between line 14 and line 16.

FIG. 7 represents a modification of switch 18 given for illustrative purpose to show that switch 17 may be constructed such as not to depend upon being actuated by means of the guide pin or guide blade of a slot car. In this example of an embodiment of switch 18 comprises an electromagnetic pickup transducer 150 comprising a core 152 made of material such as ferrite around which is wound a coil 154. Coil 154 is placed in the base circuit of an NPN transistor 156, the base 158 of which is connected through coil 154 through diode 160 and to ground through a bias resistor 162 having a capacitor 164 in parallel therewith. The emitter 168 of transistor 156 is directly connected to ground and forms with the collector 170 of the transistor a series circuit including the coil 172 of a relay 174 and a direct current supply 176 having a grounded negative terminal. A diode 178 shunts the coil 172 of relay 174. Relay 174 comprises a normally open switch 178 placed in a circuit connecting one terminal of a power supply to the inductor 20 of the stepping switch 22 of FIG. 1.

In view of the slightly negative bias applied to the base 158 of transistor 156 due to the presence of resistor 162 in the base circuit of the transistor, the collector 170-emitter 168 circuit thereof is normally in an off condition. An electrical signal induced through coil 154 of electromagnetic pickup transducer 150 is caused by the passage of core 114 in the proximity thereof, a variable magnetic flux being induced through core 152 from the permanent magnets of motor 180 adapted to drive the rear wheels, such as 182, of the car. The electrical signal induced in coil 154 is rectified through diode 160 and applied to the base 158 of transistor 156 a positive bias that renders the collector 170-emitter 168 circuit thereof conductive, as a result of the current flow through diode 160 charging the capacitor 164 so that the plate thereof connected to the base 158 of transistor 156 is at a positive potential. The current flow in the collector-emitter circuit of the transistor 156 through coil 172 of relay 174 actuates switch 178 to a closed position, thus causing the rotor 21 of stepping switch 22 to be rotated. The switch rotor moves to a new exclusive position as hereinbefore explained. Diode 178 shunting the coil 172 of relay 174 prevents large transient voltages which could be damaging to the transistor 156 from being applied across the collector 170-emitter 168 terminals thereof.

It is evident that the herein described and illustrated embodiments are only a few examples of possible arrangements according to the principles of the invention, for a timer and lap counter apparatus for slot cars such as are used in slot car race tracks, and that many changes, additions and modifications will become apparent to those skilled in the art without departing from the spirit and scope of the present invention as enunciated in the appended claims. It is also evident that the principles of the invention are also applicable to arts other than the slot car racing art and may be incorporated in other types of competitive games such as miniature horse races and the like.

We claim:

1. A timer and lap counter for a slot car having guiding means engaging a car guiding slot in a racetrack comprising: switch means actuated by the guiding means of the slot car for producing an electrical signal at each passage of said slot car at a predetermined location of said racetrack, said switch means comprising a fixed contact disposed at the bottom of the slot in said racetrack, a flat springlike movable contact having an end affixed to the bottom of the slot in said racetrack and another end normally disengaged from said fixed contact and adapted to engage said fixed contact when said guiding means engages said flat springlike movable contact upon passage of said guiding means of said slot car; an electrical stepping switch having a first and a second movable contacts steppable by each said electrical signal in engagement with respectively a first and a second pluralities of consecutive stationary contacts; first timing means electrically connected to said first plurality of stationary contacts for measuring the total time taken by said slot car to run a race; at least one second timing means electrically connected to at least the first one of said second plurality of stationary contacts for measuring the time taken by said slot car to run at least a first lap on said racetrack; and consecutive numeral digit display means each displayed upon successive advances of said stepping switch for providing a visual indication of the lap number travelled by said slot car.

2. The timer and lap counter of claim 1 wherein said first and second timing means comprise an electric motor driven digital counter giving a direct time readout.

3. The timer and lap counter of claim 1 wherein said numerical digit display means comprises a plurality of incandescent light bulbs providing an instantaneous visual numerical display of the lap number travelled by said slot car.

4. The timer and lap counter of claim 1 wherein said numerical digit display means comprises a face dial integral with said stepping switch and amovable pointer displacable to consecutive numerical digits.

5. A timer and lap counter for a slot car having guiding means engaging a car guiding slot in a racetrack comprising: switch means actuated by the guiding means of the slot car for producing an electrical signal at each passage of said slot car at a predetermined location of said racetrack, said switch means comprising a magnet of flat spring spaced apart stationary contacts disposed at the bottom of said slot car and a current conductive elongated member disposed at the bottom of the guiding means of said slot car and adapted to be engageable simultaneously with both said stationary contacts upon passage of said slot car thereover; an electrical stepping switch having a first and a second movable contacts steppable by each said electrical signal in engagement with respectively a first and a second pluralities of consecutive stationary contacts; first timing means electrically connected to said first plurality of stationary contacts for measuring the total time taken by said slot car to run a race; at least one second timing means electrically connected to at least the first one of said second plurality of stationary contacts for measuring the time taken by said slot car to run at least a first lap on said racetrack; and consecutive numeral digit display means each displayed upon successive advances of said stepping switch for providing a visual indication of the lap number by said slot car.

6. The timer and lap counter of claim 5 wherein said first and second timing means comprise an electric motor driven digital counter giving a direct time readout.

7. The timer and lap counter of claim 5 wherein said numerical digit display means comprises a plurality of incandescent light bulbs providing an instantaneous visual numerical display of the lap number travelled by said slot car.

8. The timer and lap counter of claim 5 wherein said numerical digit display means comprises a face dial integral with said stepping switch and a movable pointer displacable to consecutive numerical digits.

9. A timer and lap counter for a slot car having guiding means engaging a car guiding slot in a racetrack comprising: switch means actuated by the guiding means of the slot car for producing an electrical signal at each passage of said slot car at a predetermined location of said racetrack, an electrical stepping switch having a first and a second movable contacts steppable by each said electrical signal in engagement with respectively a first and a second pluralities of consecutive stationary contacts; first timing means electrically connected to said first plurality of stationary contacts for measuring the total time taken by said slot car to run a race; at least one second timing means electrically connected to at least the first one of said second plurality of stationary contacts for measuring the time taken by said slot car to run at least a first lap on said racetrack; and consecutive numeral digit display means
each displayed upon successive advances of said stepping switch for providing a visual indication of the lap number travelled by said slot car; wherein said switch means comprises electromagnetic pickup means adapted to turn on a normally off solid state switch, and relay means in the output circuit of said solid state switch for closing an electrical circuit for advancing said stepping switch movable contacts to each consecutive contact of said first and second pluralities of stationery contacts.

10. The timer and lap counter of claim 9 wherein said first and second timing means comprise an electric motor driven digital counter giving a direct time readout.

11. The timer and lap counter of claim 9 wherein said numerical digit display means comprises a plurality of incandescent light bulbs providing an instantaneous visual numerical display of the lap number travelled by said slot car.

12. The timer and lap counter of claim 9 wherein said numerical digit display means comprises a face dial integral with said stepping switch and a movable pointer displaceable to consecutive numerical digits.
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,572,711 Dated March 30, 1971

Inventor(s) THOMAS H. CONKLIN, ET AL

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

IN THE SPECIFICATION

Column 3, line 61, change "46" to -- 36 --

Column 5, line 12, after "18" insert a comma (,)
followed by -- switch 18 --

Signed and sealed this 6th day of July 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR. WILLIAM E. SCHUYLER,
Attesting Officer Commissioner of Patents