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H. C. EVELYN

ELECTRIC TOY

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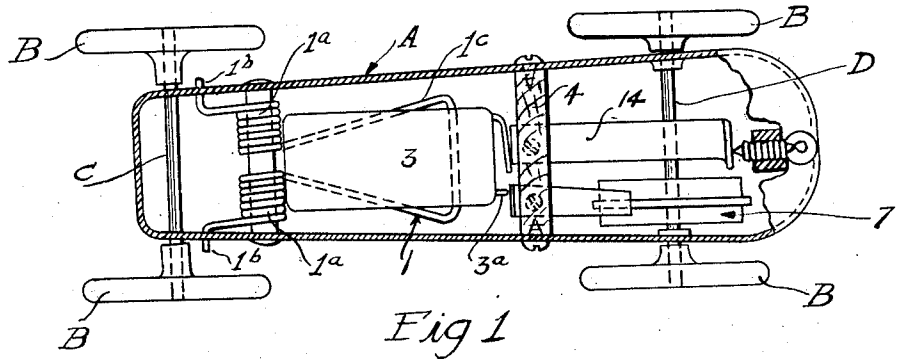


Fig 1

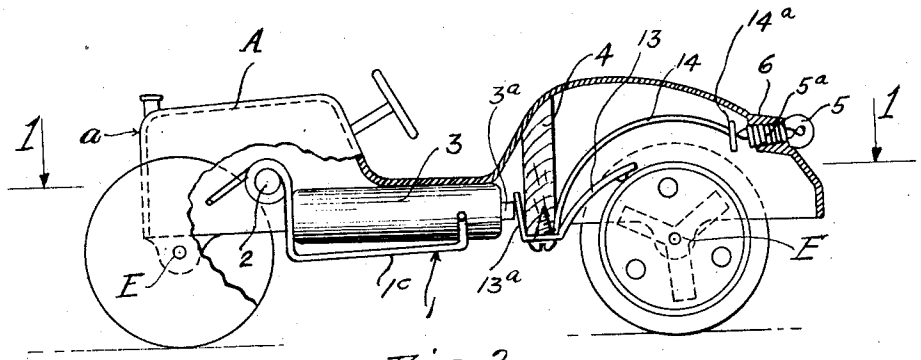


Fig 2

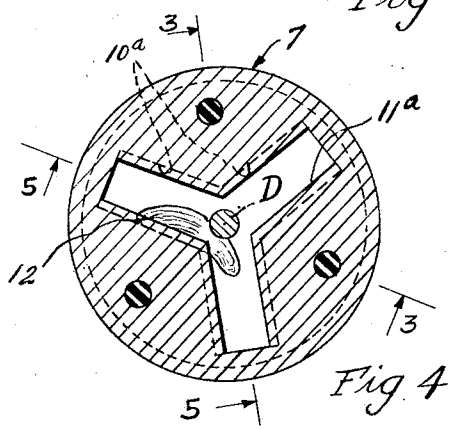


Fig 4

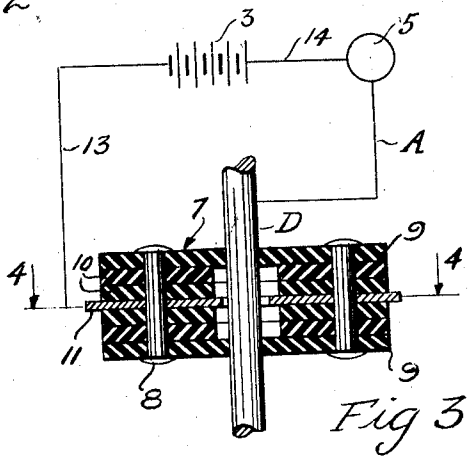


Fig 3

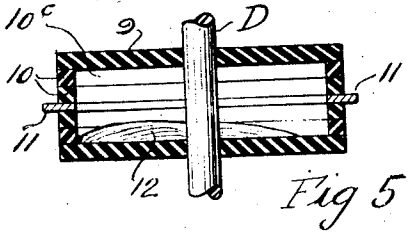


Fig 5

INVENTOR.
Harry C. Evelyn
BY
offices Mechlhose Rossell & Hodge
ATTORNEYS.

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UNITED STATES PATENT OFFICE.

HARRY C. EVELYN, OF CHICAGO, ILLINOIS.

ELECTRIC TOY.

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This invention relates to toys and more particularly to toys equipped with a lamp operated by a dry battery carried in the body of the toy and which operates automatically when the toy is moved to produce a blinking or flashing light.

The object of the invention is to provide a novel toy, having increased attraction to children by reason of the flashing light which is produced when the toy is manipulated.

A further object of the invention is to provide a simple inexpensive form of switch or current controlling mechanism, which will reduce the consumption of current to a minimum, due consideration being had to the fact that the practicability of an illuminated toy depends upon an economic use of the limited current supply furnished by a small dry cell such as would have to be used. Thus it is conceived that a blinking or flashing light will permit a battery to last longer and avoid frequent replacement. Moreover, it is desirable that the light controlling mechanism be of such construction that the lamp will not function when the toy is at rest or held in any position.

I have illustrated a preferred embodiment of my invention in the accompanying drawings, in which:

Figure 1 is a view in horizontal section through the vehicle as taken on line 1—1 of Figure 2 and showing the electrical parts in elevation;

Figure 2 is a view in side elevation of the vehicle with portions of the body broken away and shown in section to reveal the electrical parts;

Figure 3 is an enlarged detail view in cross section of the switch member taken on line 3—3 of Figure 4, together with a diagrammatic representation of the electrical connections;

Figure 4 is an enlarged detail view in section taken on line 4—4 of Figure 3; and

Figure 5 is a cross sectional view of the switch taken on line 5—5 of Figure 4.

As disclosed in the drawings thus briefly described, the invention is applied to a toy automobile, although it is equally applicable to other toys, such as boats, mounted on wheels, figures of animals and human beings, as well as many other kinds of toys which are self propelled or drawn along the ground. Furthe more, the same arrangement of electrical apparatus can be readily applied to miniature vehicles which are pedal propelled.

The toy vehicle here illustrated consists generally of a body A made of tin or sheet metal, provided with front and rear wheels B fixed to front and rear axles C and D respectively, which turn in simple form of bearings such as E.

The body A is hollow and readily accessible from the underside, thus providing ample space for the mounting of the electrical parts now to be described.

At the forward end of the body within what would be a hood *a*, thereof, is the battery retainer 1, consisting of wire shaped to form coil springs 1^a, which surrounds a pin 2 extending crosswise of the hood *a*. The free ends of the coils are anchored in the sides of the hood by passing the bent ends 1^b, 1^b through holes formed therein. The portion of the wire intermediate the coils 1^a are shaped to form a triangular frame 1^c extending rearwardly and forming a holder for a small battery or dry cell 3, lying horizontally beneath the central portion of the body, or what would be the driving compartment. Just forwardly of the rear wheels and adjacent the rear end of the battery 3 is a block 4 preferably of wood and securely fitted into the body in vertical position. Secured to this block are the various conductors and contact members which carry the current from the battery 3 to a small electric lamp 5 having a threaded base 5^a removably held within a threaded socket 6 forming a part of the body A.

Mounted on the rear axle D and fixed to rotate therewith is the switch member or circuit controlling element 7, this switch member being cylindric in shape and mounted within the body adjacent one of the rear wheels. Figures 3, 4 and 5 show the details of construction of this switch member which will be understood from the following: The body of the switch member is made of insulating material, preferably of laminated construction consisting of a number of fibre disks secured together by means of rivets 8. The outer disks 9—9 are solid whereas the inner disks 10 are provided with a group of three slots 10^a radiating from the centers thereof and terminating near their peripheries. The slots 10^a of the several intermediate disks 10 register with each other and form three radiating passages communi-

cating with each other at the center of the switch member. Interposed between the centrally disposed intermediate disks 10 is a thin metal disk 11 having the same arrangement of slots 11^a, but slightly narrower in width so that the inner edges of the slots extend a short distance inwardly from the corresponding edges of the channels formed by the intermediate fibre disks, as well as the metal disks, are mounted on the rear axle D of the vehicle, which is a round metallic rod, and the three passages formed within the switch member are grouped symmetrically about said axle as clearly shown in Figure 3. The metal plate 11 approaches in close proximity to the axle at three points spaced equidistantly about the axle and formed by the intersection of the margins of the three radial slots.

Within the chamber or connecting passageways formed by the intermediate fibre disks 10 and metal disk 11 is a mass or globule of mercury 12, which, due to its fluid characteristics, flows readily by gravity, always seeking its lowest level. Thus, visualizing the switch member 7 as rotating in a clockwise direction, as shown in Figure 4, it is manifest that the mass of mercury 12 will flow successively from one radial passage to the next as the switch member is rotated. Thus, the mass is shown as flowing from the radial chamber which is just passing beyond a horizontal position, so that the mercury flows by gravity into the passage immediately following and about to assume a vertical position with its closed end downwardly. Moreover, it is to be observed that in flowing from one chamber to the other the mercury passes through the narrow space between the axle D and the adjacent point of the metal disk 11, thus establishing a metallic circuit across the gap between these points. This circuit, however, is maintained for only a short period, inasmuch as the mercury will continue to flow by gravity regardless of whether the switch member continues its rotative movement, or should be brought to a stationary position. In short, the fluid state of the mercury makes it impossible for the circuit to be closed between the axle D and the metallic disk 11 for more than the period of time required for the mercury to flow between these points, regardless of whether the toy is stationary or being propelled. As a result, it is impossible for the lamp to burn except when it is being propelled, and then for only a short period of time. Therefore, it follows that during each revolution of the axle D the circuit is opened and closed three times, thereby producing an intermittent or flashing signal at the lamp 5, the intervals depending on the speed of the propeller.

Having described the action of the switch member and the manner in which the circuit is intermittently opened and closed, the remaining part of the electric circuit is comparatively simple. In the first place, it is to be observed that the metallic disk 11 of the switch member 7 projects a short distance beyond the periphery of the adjacent fibre disks. Bearing on the edge of this metal disk is a spring contact finger 13 secured to the underside of the block 4 and having at its other end a short spring contact finger 13^a adapted to be engaged by one of the terminals 3^a of the battery 3. Immediately adjacent the spring finger 13 and extending rearwardly at the center of the vehicle body is another contact member 14 in the form of a curved metal strip fixed to the underside of the block 4 and terminating at its rear end in a contact 14^a adapted to have electrical contact with the end terminal of the lamp 5, the other terminal of said lamp being the threaded sleeve in electrical connection with the axle D through the metal body of the toy.

Figure 3 shows diagrammatically the electrical circuit, the various elements thus shown being indicated by the same reference characters.

Thus it will be seen as the vehicle is propelled and the switch member 7 rotates with the axle D, that the electrical circuit through the lamp is intermittently opened and closed, thus producing a flashing or blinking light so long as the toy is in motion. In all other positions of the toy, whether at rest or in motion, the mercury within the switch member seeks its lowest level, thus maintaining the circuit open across the points.

Figure 5 discloses the action of the mercury when the vehicle is held in such a position that the rear axle is vertical. Here again, the mercury seeks its low level and spreads out in a thin layer throughout the bottom of the radial chamber in which it happened to be when the position of the vehicle is shifted. As thus disposed, the mercury is entirely out of contact with the metallic plate 11 so that the circuit remains open.

From the foregoing it will be seen that regardless of the position in which the toy may be held, that it is impossible for the circuit to remain closed and thus exhaust the battery. The advantages therefore of the herein disclosed switch mechanism as applicable to toy vehicles resides in the economy of current consumption as well as the inability to exhaust the current when the toy is not in use or placed in such a position that the lamp would remain lighted with the attendant result of exhausting the battery and requiring frequent replacement.

While I have illustrated and described the application of a lamp and switch to a toy vehicle it is to be understood that it can be readily applied to other toys, in which the flashing light may be produced by the bod-

ily tilting of the toy, as for instance, in illuminating the eyes of a doll or animal.

I claim as my invention:

1. In a wheeled toy the combination of a lighting circuit for said toy including a lamp, a battery and a rotative switch for controlling said circuit, comprising a body member adapted to revolve on its axis in the propulsion of the toy, and provided with chambers radiating from its axis, a mass of mercury adapted to flow from chamber to chamber in the rotation of said body member, and terminals located in the path of said mass of mercury and electrically connected in said circuit.

2. In a toy the combination of a body mounted on wheels provided with axles rotating with said wheels, a lamp on said body, a battery in circuit with said lamp and a switch member mounted on one of said axles and comprising a cylindric body of insulating material provided with a plurality of internal chambers radiating from said axle, contact points located at the entrance to each chamber and spaced a relatively short distance from said axle, said contact points and axle constituting terminal points of the lamp circuit, and a mass of mercury in said switch member, and adapted to momentarily close the circuit across said axle and successive contact points in the rotation of said switch member.

3. In a toy the combination of a body, mounted on wheels provided with axle rotating with said wheels, a lamp on said body, a battery in circuit with said lamp and a switch member mounted on one of said axles and comprising a hollow cylindric body of insulating material through which one of said axles extends and having a plurality of chambers radiating from the said axle, a metallic disc passing through said body intermediate the ends thereof and provided with contact points separated from said axle by air gaps, and a mass of mercury in said body adapted to flow from chamber to chamber in the rotation of said switch member to successively close the circuit across said air gaps.

4. In a wheeled toy the combination of a lamp circuit therefor including a lamp, a battery and switch comprising a cylindric body of insulating material provided with a central cavity and passages extending radially from said cavity, a shaft extending axially of said body and mounted in said toy to turn on a horizontal axis when said toy is propelled, a conductor mounted in said switch body and having portions exposed adjacent said shaft, and a mass of mercury within said body and adapted to flow from passage to passage and to intermittently close the circuit through said conductor and shaft in the rotation of said switch member.

5. In a toy, the combination of a body mounted on wheels, a lamp circuit carried by the toy body and including a lamp, a battery and a cylindric body of insulating material mounted on a horizontal axle rotating in the propulsion of the toy, said switch body having a central cavity extending axially thereof, chambers extending radially from said cavity, and contact members located adjacent said axle intermediate said chambers and spaced from the ends of said cavity, a mass of mercury in said switch body, and adapted to intermittently close a circuit across said axle and said contact members when the axis of said switch member is horizontal, and means for connecting said axle and contact members in circuit with said lamp and battery.

6. In a wheeled toy, the combination of a body having an axle adapted to revolve when said toy is propelled, a lamp circuit carried by said toy body, including a lamp, a battery and a switch comprising a cylindric body mounted on said axle and provided with a plurality of internal chambers, extending radially from a central cavity surrounding said axle, a plate located between the ends of said switch body and conforming to the cross-sectional contour of said central cavity and chambers thereof, a mass of mercury in said switch body and adapted to intermittently close a circuit from said plate to said axle and a spring contact member in said circuit and having wiping contact with said axle.

Signed at Chicago, this 16th day of Sept., 1925.

HARRY C. EVELYN.