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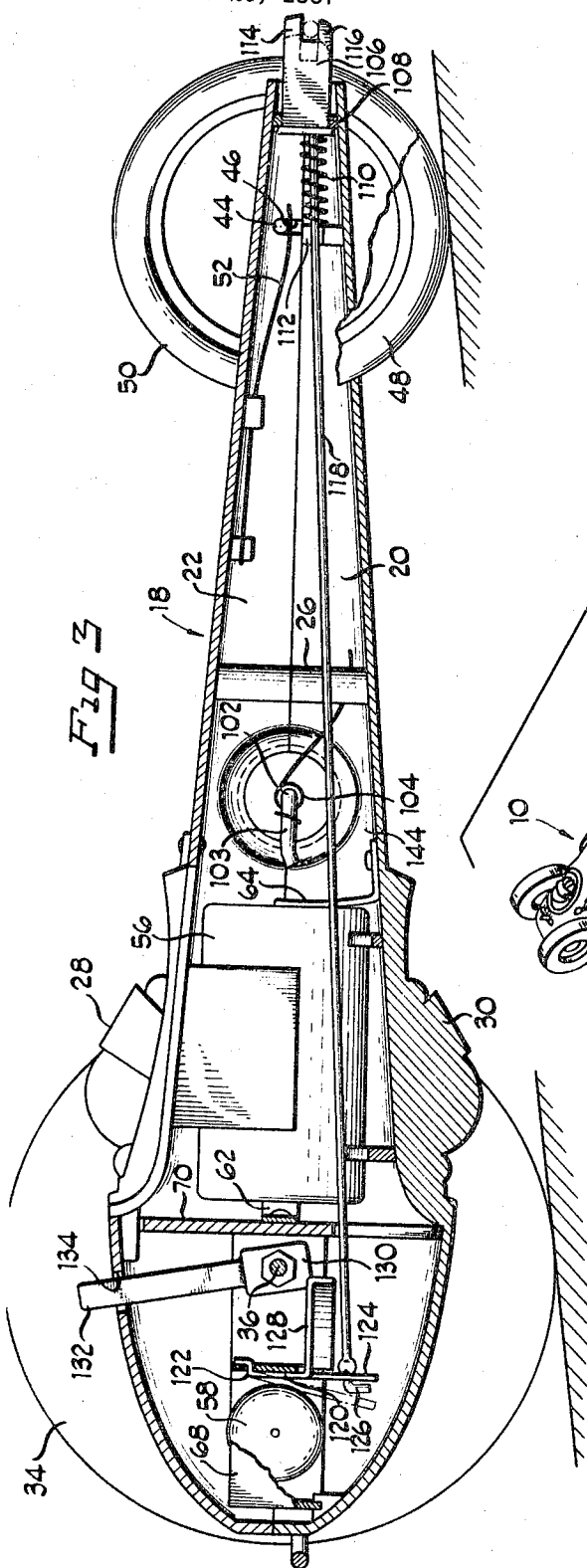
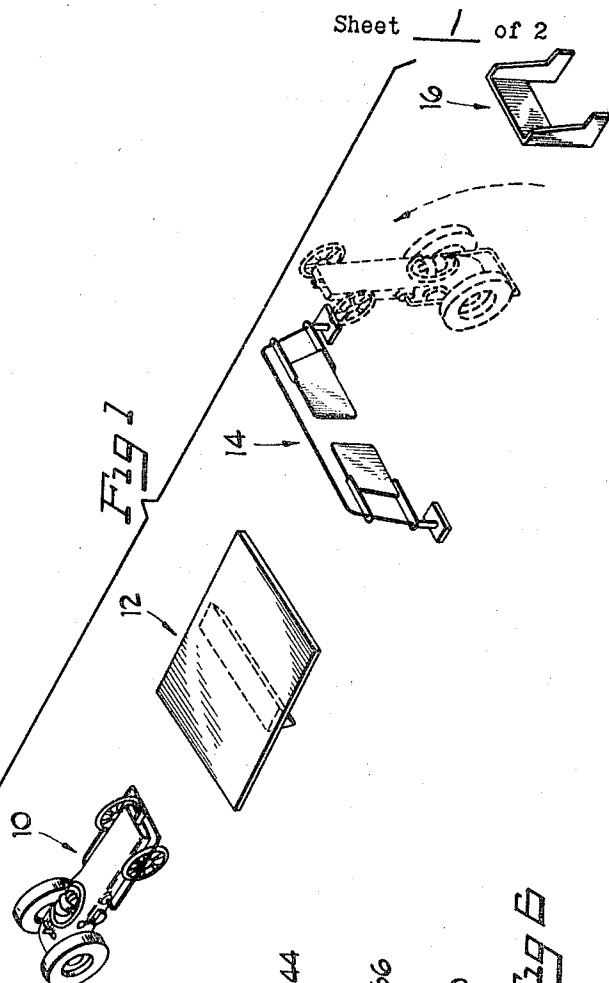
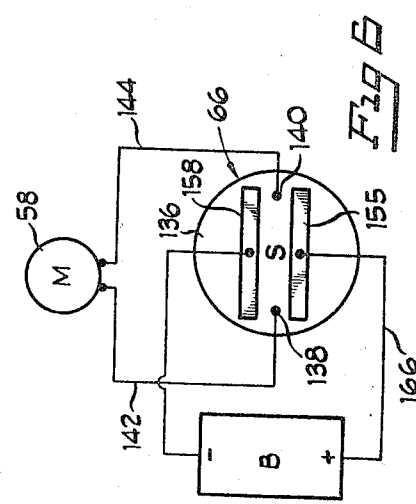
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3,445,959

REVERSIBLE RACE CAR

Filed Jan. 25, 1967

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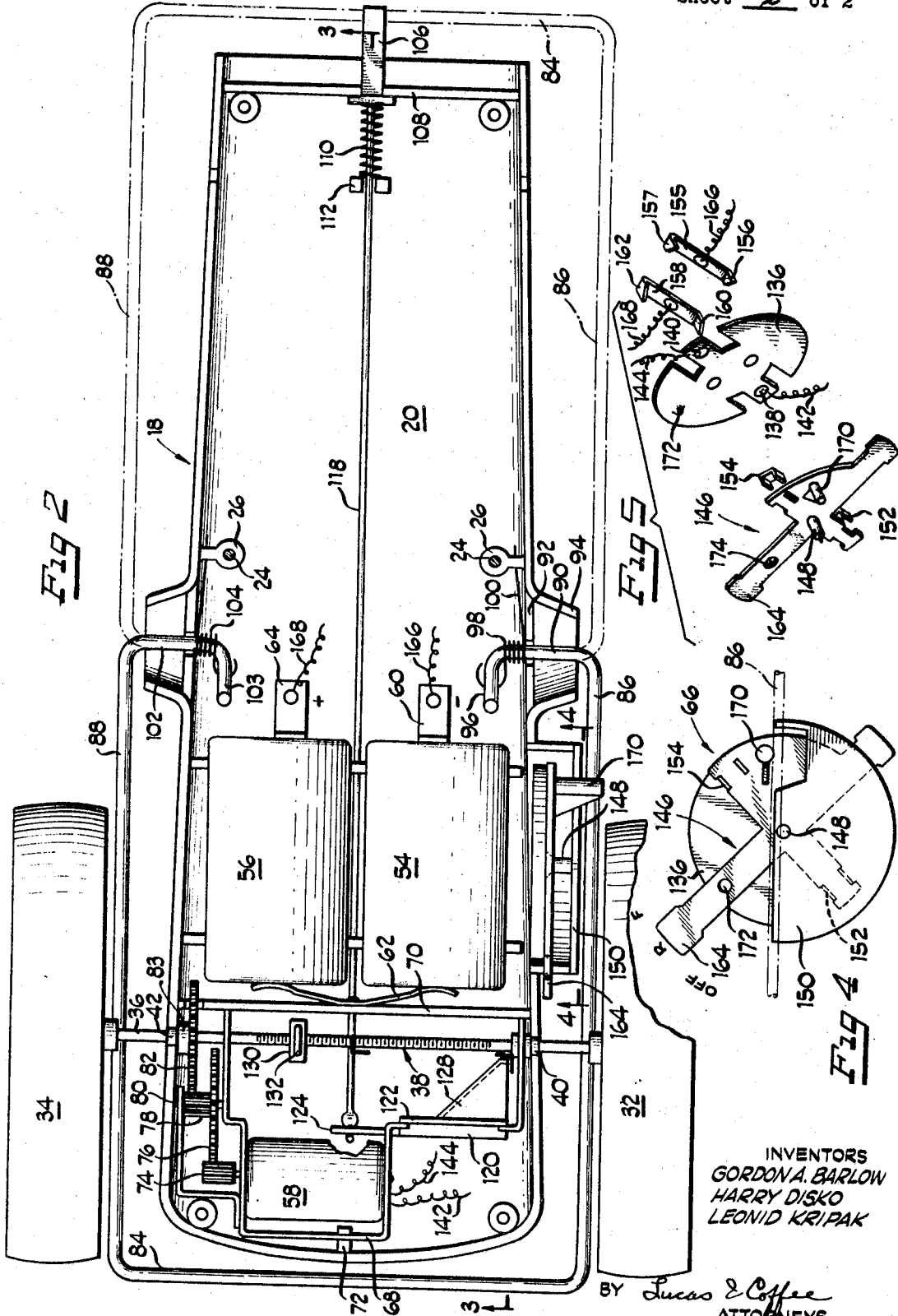
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REVERSIBLE RACE CAR

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7 Claims

ABSTRACT OF THE DISCLOSURE

A self-propelled toy racing car having its rear driving wheels arranged so that the car can pivot about the axis of such wheels, and having a spring means adapted to strike the supporting surface and turn the car over. A reversible motor and switch means are arranged for co-operation with the spring means to reverse the rotation of the drive wheels when the car is turned over. Further, there is provided means for determining the distance of the forward travel of the car before actuating the spring means to overturn the car and reverse its travel.

Background of the invention

Self-propelled toy vehicles have been made heretofore which either stop or reverse their direction of travel upon striking an object. Typical of the prior art developments are those devices disclosed in U.S. Patent 963,715, U.S. Patent 2,770,074, and U.S. Patent 2,943,418. In each of the prior art devices, a movable portion of the vehicle or toy responds to the striking of an obstacle to effect a change in the motion of the device.

Summary of the invention

The present invention relates to a self-propelled toy comprising a body portion, traction wheels on the rear of the body and supporting wheels on the front, means biased to exert a downward pressure on the toy supporting surface and thereby overturn the car, retaining means preventing the exerting of said downward pressure by the biasing means, and means for disabling the retaining means during the travel of the toy.

It is an object of the invention to provide a toy car of the type currently known as a "drag racer," having large driving wheels and a long wedge-like front portion having smaller supporting wheels, with the upper and lower surfaces of the car being substantially identical so that it will appear the same whichever side is up; and mechanism is provided to propel the car and so constructed that, when properly preset, the car will travel a predetermined limited distance, whereupon it will be turned over about its rear wheels onto its back, and the power reversed so that it will travel back in the direction from which it came. The overturning mechanism may also be started by impact with an obstruction, and it is contemplated that various objects will be provided so that an obstacle course can be set up to be negotiated by the car to test its capabilities, and those of the operator.

Further objects and advantages will become apparent from the following description of an illustrative embodiment of the invention, and from the accompanying drawings.

Brief description of the drawings

FIGURE 1 is a perspective view of the car, a tilt-board a swinging gate, and a limit stop or bumper, also showing the car in broken lines in the act of turning over;

FIGURE 2 is an enlarged plan view of the car with the upper portion of the body removed and with parts in section;

FIGURE 3 is a vertical sectional view taken on the line 3-3 of FIGURE 2;

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FIGURE 4 is a side elevation of a portion of the car showing a controlling switch, and taken on the line 4-4 of FIGURE 2;

FIGURE 5 is an "exploded view," somewhat reduced, of the component parts of the switch shown in FIGURE 4; and

FIGURE 6 is a diagram of the electrical circuit.

Description of the preferred embodiment

As seen in FIGURE 1, the car generally designated as 10, is approaching a tilt-board 12 which will rock under its weight and allow the car to proceed through a set of swinging gates 14 into contact with a stop or bumper 16 which will trip the overturning mechanism and cause the car to flip over as suggested in broken lines in a manner to be fully described.

The car comprises a body 18 including a lower section 20 and an upper section 22, as seen in FIGURES 2 and 3, the sections being separably fastened together in any suitable manner, as by screws or the like 24 engaged in bosses 26. Upper portion 22 is formed with a simulation of a driver's head 28, wearing a crash helmet, the lower section 20 is formed with a similar simulated head 30, the latter to come into view when the car is flipped over as previously described, so that whichever side is up, the car will appear to have a driver. The body 18 has an enlarged rear portion and tapers to a generally horizontal wedge shape toward the front.

Body 18 is supported at the rear on traction wheels 32 and 34 fixed on an axle 36 which is threaded at 38 and throughout most of its length for a purpose to appear, and which axle is carried in bearing portions 40 and 42 in the walls of lower section 20. Wheels 32 and 34 are large enough to extend beyond the upper margins of upper section 22 and beyond the rear of the car body, so as to support body portion 18 clear of the floor or ground when inverted. A front axle 44 extends through slots 46 in upper section 22 near the front portion of body 18 and carries supporting wheels 48 and 50 which are also large enough to carry body 18 clear of the floor either in its initial or in its inverted position. Axle 44 is yieldingly held in the top (which becomes the bottom when the car is inverted) of slots 46 by a cantilever spring element 52, so that axle 44 may shift slightly in the slots as permitted by yielding of spring 52 to ease the impact when the car flips over.

The illustrated car is electrically propelled, and power is supplied by dry cells 54 and 56 cradled within body 18 and connected with each other electrically and with a motor 58 by means of spring clips 60, 62 and 64 and through a reversing switch generally designated as 66. It is to be observed that body 18 is preferably made of plastic, which is a good insulator, so that electrically conducting parts such as clips 60 and 64 can be mounted anywhere that is convenient without significant insulating problems.

Motor 58 is supported in a bracket-frame 68 secured in any suitable manner within body 18 as by contact with axle 36, a bulkhead 70 and a lug 72, and motor 58 has a pinion 74 driving an idler gear 76 fixed on a pinion 78 journaled on a pin 80 carried on bracket frame 68. Pinion 78 meshes with and drives a gear 82 fixed on axle 36 as by a pin 83 so as to drive the latter at a reduced rate as compared with the very rapid rotations of pinion 74.

The mechanism for overturning the car comprises a bail preferably formed of stiff wire and having a front portion 84 normally extending across the front of the car, and side portions 86 and 88 extending along the sides of body portion 18. Side 86 has an intumed pintle portion 90 journaled in a disc 92 formed in the body inwardly of a funnel-like extension 94 on the side of lower portion 20 of body 18. Pintle portion 90 has an end portion 96 which

is bent into a position substantially parallel to side 86 in the present instance, and which is engaged by one end of a spring 98 coiled about pintle 90 within body 18 and having another end portion 100 engaged with a portion of lug 26, the spring being arranged to tend to rotate pintle 90 in a clockwise direction as related to FIGURE 3 so that the bail is biased to exert a downward pressure on the floor or ground when free. In similar manner, side portion 88 has a pintle portion 102 and a spring 104 which adds its power to that of spring 98. The bail is held in the position shown in broken lines in FIGURE 2 by retaining means in the form of a latch element 106 slidably supported in a suitable opening in a partition 108 fixed in lower section 20 of body 18 and urged forwardly by a spring 110 engaged therewith and with a lug 112 fixed in lower section 20. Latch 106 has a long upper lip 114 and a relatively short lower lip 116, forming therebetween a notch for the reception of bail portion 84, and an actuating rod 118 fixed on latch 106 extends backwardly through body portion 20, between cells 54 and 56 to a point beyond axle 36. Long lip 114 may encounter an obstruction and thereby disable the latch to the extent that bail portion 84 will be released to cause overturning of the car.

Mounted at the rear of the car, adjacent motor 58 is a rocker plate 120 having an upper offset portion 122 loosely engaged in notches in an upper portion of bracket frame 68 to permit plate 120 to swing rearwardly, and the plate has a lower portion 124 constituting a lever arm loosely engaged with the rear end of rod 118, as by an offset portion 126, so that rocking of plate 120 about upper offset portion 122 in a clockwise direction will pull rod 118 and retract latch 106 from engagement with bail portion 84, thereby disabling the latch in its function of retaining bail portion 84. Plate 120 has a shelf-like camming portion 128 extending forwardly of offset portion 122 beneath and beyond bracket frame 68 into the path of a distance-setting element in the form of a traveler 130 engaged with the threaded portion 38 of axle 36. Traveler 130 has an arm 132 extending upwardly through a slot 134 in upper section 22 of body 18. Slot 134 extends laterally of body portion 22 for a substantial portion of the width thereof and serves to prevent rotation of traveler 130 with axle 36, and also, by its position in slot 134, indicates the position of traveler 130 on axle 36.

As will now be apparent, operation of the car in what might be termed the forward direction will cause movement of traveler 130 along axle 36 toward cam plate 128, and when the cam plate is engaged it will be depressed by the traveler, pulling backwardly on rod 118 and releasing bail portion 84 from the broken line position in FIGURE 2, whereupon bail portion 84 will be forcibly engaged with the floor or ground, the reaction on body 18 causing the front of the latter to rise and in fact to turn completely over as suggested in FIGURE 1, with bail portion 84 coming to rest across the rear end of the body 18 as indicated in full lines in FIGURES 2 and 3. Portion 20 of body 18 now becomes the upper portion, while portion 22 becomes the lower and the car will be inverted or turned over with respect to its position in FIGURE 2.

After the car has been overturned, the rotation of wheels 32 and 34 must be reversed and this is accomplished by switch 66 as hereinbefore stated.

Motor 58 is of a type in which reversal of the polarity of the current input will reverse the rotation of pinion 74, and switch 66 is so constituted that it will have one position in which the polarity is one way, and another position in which the polarity is reversed as applied to motor 58.

Switch 66 comprises basically a plate 136 of insulating material fixedly mounted on lower section 20 in any suitable manner and having contacts 138 and 140 best seen in FIGURES 4 and 5, connected by wires 142 and 144 respectively with motor 58. A switch plate member 146 is juxtaposed to plate 136 and is capable of oscillating on a pin 148 journaled in a bracket plate 150 (see also FIG-

FIGURE 2), plate 147 having a pair of conductive contacts 152 and 154, pressed, in one position of plate 146, respectively into electrical connection with contacts 138 and 140. A dual contact 155 has contact points 156 and 157 extending through slots in plate 136 on one side of contacts 138 and 140, and a dual contact 158 has contact points 160 and 162 extending through slots in plate 136 on the other side of contacts 138 and 140. Switch plate 146 has a lever arm 164 extending generally upwardly when the car is in the position shown in FIGURES 2 and 3, and which may be used for manually shifting plate 146. Contact 155 has a wire 166 leading to spring clip 60 which, for example, is in contact with the positive terminal of cell 54, and contact 158 has a wire 168 connected with spring clip 64 which is in contact with the negative terminal of cell 56. The opposite terminals of cells 54 and 56 are connected by spring 62 so that the cells are connected in series in well-known manner.

Plate 146 also has a finger 170 extending in a direction away from plate 136 into the path of bail side portion 86 so that the switch may be actuated by movement of the bail. A dimple 172 is provided on plate 136 which enters an opening 174 in lever arm 164 to yieldingly maintain the switch in predetermined desired position.

The operation of the toy is as follows:

As seen in FIGURES 2 and 3, the car is ready to start except that the bail has not been set. The car will be picked up and bail portion 84 will be forcibly pushed down and swung beneath the body portion 18 and up in front, as shown in broken lines, until short lip 116 is pushed aside with compressing of spring 110, whereupon bail portion 84 will become caught in the notch formed between lips 114 and 116. Switch lever 164 is then pushed forwardly, rocking switch plate 146 and shifting contact 152 into electrical contact with contact point 160 while still in connection with contact 138. This shifting also brings contact 154 into electrical connection with contact point 157, while still in connection with contact 140. Current will then flow from the battery through wire 166 and wire 144 to motor 58, returning to the battery through wire 142 and wire 168. Motor 58, as hereinbefore stated is so constructed that this will cause actuation thereof in the direction to propel the car toward the right as seen in FIGURES 2 and 3. Because of the rotation of axle 36, traveler 130, being prevented from rotating by engagement of arm 132 with slot 134, will move slowly along threaded portion 38 of axle 36, downwardly as seen in FIGURE 2, or toward the right side of the car as related to the direction of travel. In due course traveler 130 will encounter camming portion 128 and depress it, rocking plate 120 and arm 124 and pulling on rod 118. Spring 110 will be compressed and latch 106 pulled out of engagement with bail portion 84 which will then forcibly engage the floor and react against the car, turning it over completely, as suggested in FIGURE 1, and coming to rest with portion 84 across the back of the car instead of in front as formerly.

Near the end of its movement bail side portion 86 will encounter pin 170 on plate 146 of switch 66 and swing the plate in a counterclockwise direction sufficiently to shift contact 152 from connection with contact point 160 into connection with contact point 156, but without breaking connection with contact 138. At the same time contact 154 will be shifted from connection with contact point 157 into connection with contact point 162 but without breaking its connection with contact 140. Current will then flow from the battery through wire 166 as before, but this time through wire 142 to motor 58, returning through wire 144, which, it will be noted, is the opposite direction to which it flowed before. Motor 58 will now drive pinion 74 in the opposite direction so that the car will travel back the way it came. In this position of plate 146, lever 164 will be engaged by dimple 172 to insure that plate 146 is not swung too far by the action of bail portion 86.

Incidentally this motion will cause traveler 130 and arm

132 to move back away from camming plate 128 an amount determined by the distance which the car is allowed to run in the reverse direction. In the event the car is not stopped before traveler 130 reaches the end of screw 38, the traveler moves on to an unthreaded portion of the axle (at the top in FIGURE 2) and relative movement of the two parts continues.

Further swinging of plate 146 in a counterclockwise direction, which can be done manually by forcing lever 164 beyond dimple 172, will remove contacts 152 and 154 from connection with contacts 138 and 140, and provide an "off" position of the switch in which motor 58 is inoperative.

The distance which the car will travel, in its initial forward motion, before traveler 130 encounters camming plate 128 is dependent upon the position of traveler 130 when the car is started, and this position is readily observable by noting the position of arm 132 in slot 134. Arm 132 may be shifted before the car is started by holding the car clear of the floor and operating motor 48 in either direction by means of switch 66, or by turning wheels 32 and 34 by hand, and a measure of skill may be employed in locating arm 132 so that the reversal will take place at a desired point, such as immediately in front of barrier 16 in FIGURE 1.

Furthermore, if the car encounters an obstruction that contacts long lip 114, latch 106 will be pushed in against spring 110 and disabled so that bail portion 84 will be released at once, turning the car over and sending it back prior to any camming action of traveler 130 on plate 128.

A game might be devised involving a measure of skill in causing the car to turn over at a predetermined point, for example to have it pass tilt-board 12 and gate 14, and then turn over and reverse before hitting abutment 16, and this can be accomplished by properly locating arm 132 before aiming and starting the car. The obstacles might be otherwise arranged and other obstacles supplied, and it is to be understood that modifications of the toy and its manner of use may occur to others skilled in the art, and that, while the invention has been described in connection with a specific device, modifications could be made without departing from the principles of the invention.

What is claimed is:

1. A self-propelled toy comprising a body portion, traction wheels on the rear portion of the body portion, supporting wheels on the forward portion of the body portion, means on said toy biased to exert a downward pressure on the surface over which the toy is traveling with accompanying upward reaction on the body portion tending to overturn the same, retaining means preventing the exerting of downward pressure by the first mentioned means, and means for disabling said retaining means during the travel of said toy including a drive mechanism having a reversible electric motor, and switch means which is operable in response to the overturning movement of the car to reverse the direction of rotation of the motor drive shaft.

2. A self-propelled toy as set forth in claim 1, in which the disabling means has a portion responsive to encountering an obstruction for actuating the disabling means.

3. A self-propelled toy as set forth in claim 1, including additional means operatively interconnecting said disabling means and said traction wheels so that said disabling means is actuated after a predetermined number of rotations of said traction wheels.

4. A self-propelled toy as set forth in claim 1, wherein said downward pressure is exerted so that said body is pivoted about said traction wheels and said toy proceeds generally toward its starting position.

5. A toy vehicle comprising an elongated body portion, a pair of drive wheels mounted on an axle adjacent

one end of said body, a pair of supporting wheels adjacent the other end of said body, drive mechanism on said vehicle drivingly connected with said drive wheels and including a battery powered reversible electric motor, an electrical circuit for controlling said motor including a switch means, a member pivotally mounted on said body for movement to exert a downward pressure on the surface supporting the vehicle to turn said body portion over, spring means connected with said member so as to bias said member toward said supporting surface, latch means for releasably retaining said member in position against the biasing force of said spring means, said member being movable upon release of said latch means to exert said downward pressure, means for operating said latch means to release said member during the travel of said vehicle, and said switch means including a part in the path of movement of said member which is operable to reverse said motor when engaged by said member as the latter moves from said latched position.

6. A toy vehicle as set forth in claim 5, wherein said latch means is positioned in projecting relation to the end of said body adjacent said supporting wheels, whereby the encounter of an obstruction by said vehicle will operate said latch means to release said member.

7. A toy vehicle comprising an elongated body portion, a pair of drive wheels mounted on an axle adjacent one end of said body, a pair of supporting wheels adjacent the other end of said body, drive mechanism on said vehicle drivingly connected with said drive wheels and including a battery powered reversible electric motor, an electrical circuit for controlling said motor including a switch means, a bail member pivotally mounted on said body for movement between a first position where the bight portion of said bail extends outwardly of one end of said body and a second position where said bight portion extends outwardly of the other end of said body, spring means connected with said bail so as to bias said bail toward said second position, latch means for releasably retaining said bail in said first position against the biasing force of said spring means, said bail being movable upon release of said latch means to exert a downward pressure on the surface supporting said vehicle and turn said body over about the axis of said drive wheels, said switch means including a part in the path of movement of said bail which is operable to reverse said motor when engaged by said bail as the latter moves from said first to said second position, said axle being threaded along a substantial portion of its length, a follower on said threaded axle portion adapted to move along said axle as the latter rotates, said latch means for said bail including a movable part extending rearwardly to position adjacent said drive axle, and means connected with said movable part and engageable by said follower as the latter approaches a predetermined position along said axle, whereby said latch means is operated to release said bail for the latter to turn said body over and reverse said motor after a predetermined amount of rotation of said axle.

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