Sept. 27, 1955 A. N. GIARDINA 2,718,729

REMOTELY CONTROLLED TOY VEHICLE

Filed March 3, 1953 2 Sheets-Sheet 1

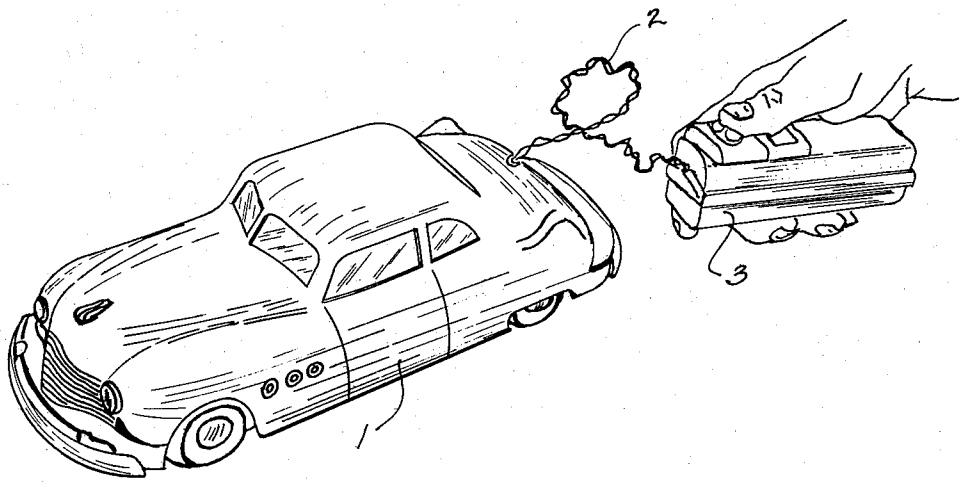


FIG 1

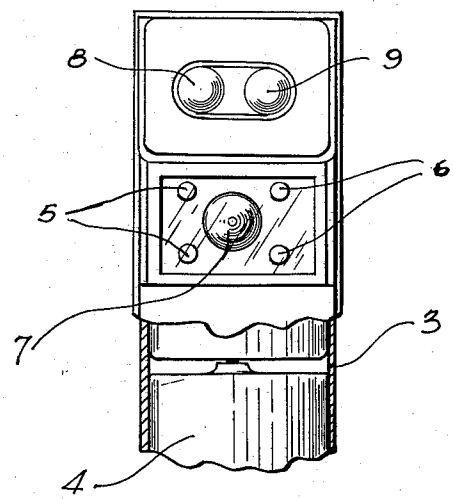


FIG 2

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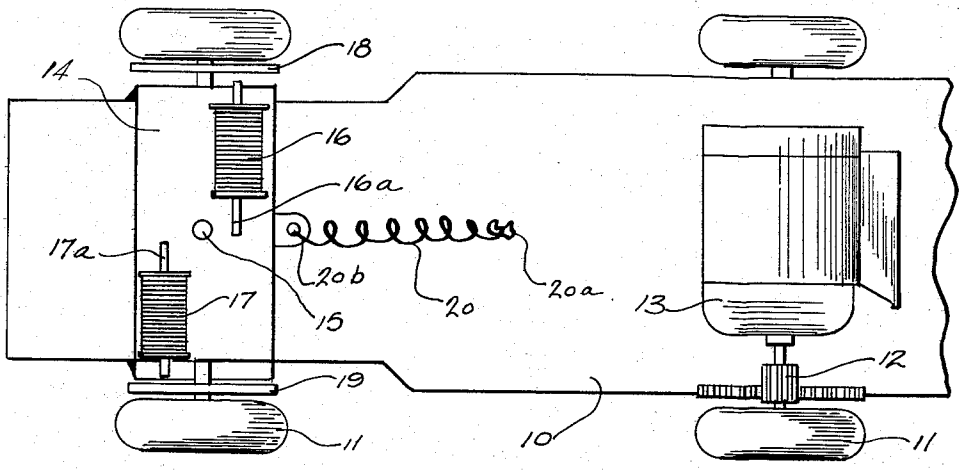


FIG 3

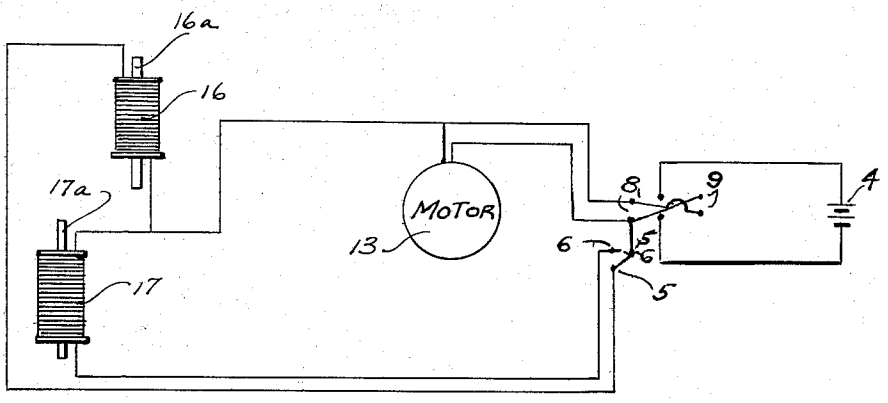


FIG 4

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REMOTELY CONTROLLED TOY VEHICLE

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Application March 3, 1953, Serial No. 340,076
6 Claims. (Cl. 46—244)

This invention relates to a toy vehicle, such as an automobile, truck or the like, and more particularly to electrical control means for remotely operating an electrically powered vehicle so as to enable the vehicle to be driven forwardly or rearwardly, and to turn to the right or left, as desired, by operation of only one hand of the operator.

An outstanding disadvantage of most powered toy vehicles, particularly spring powered vehicles, is that it is difficult or almost impossible to control the direction of movement of the vehicle, and usually the only direction in which it may go is in a straight forward direction. Another disadvantage is that if a spring motor is used it is necessary at very frequent intervals to pick up the toy and wind it, all of which is time consuming and interrupts the pleasure of the child.

An object of my invention is to provide a novel electrical operated and controlled toy vehicle which can be driven forwardly and rearwardly, and which can be turned to the right or left by a simple remotely controlled switching unit, thereby affording continuous control and movement of the vehicle without interruption, thus being devoid of the above named disadvantages.

Another object of my invention is to provide a toy vehicle driven by an electric motor which is powered by dry cells remotely situated from the vehicle and mounted on a control unit including switching means for starting, stopping, controlling the direction of movement as well as the direction of turning of the vehicle, without interruption, thus affording continuous enjoyment and enabling the vehicle to travel considerable distances.

Other objects and advantages of my invention will become more apparent from a study of the following description taken with the accompanying drawings, wherein:

Figure 1 is a perspective view of a toy automobile and control means embodying the principles of my invention.

Figure 2 is an enlarged fragmentary view, with portions of the wall cut away, of the control unit 3 of Figure 1, which is carried in the hand of the operator and which serves to control the direction of movement and of turning of the toy automobile.

Figure 3 is an enlarged plan view of the automobile chassis, that is, with the body removed and more clearly illustrating the electrical means for driving and for steering the toy automobile; and

Figure 4 is an electrical or schematic diagram showing the wiring system of the automobile and control unit shown in Figures 1, 2 and 3.

Referring more particularly to Figures 1 and 2, numeral 1 denotes a toy vehicle, such as a toy automobile (although this could be a truck, bus, locomotive or any other vehicle instead). One end of an electrical cord 2 is connected to the toy automobile in the manner to be described thereinafter. Connected to the other end of the electrical cord 2 is a remote control unit 3 which may be operated by one hand of the operator as shown.

As shown more clearly in Figure 2 the remote control unit 3 is in a form of a casing of plastic or metal enclosing therein one or more dry cells 4, for providing electric power to operate the electric driving motor for driving the car 1. Mounted on unit 3 is a single pole, single throw electric switch including a metal ball 7 which serves as a rolling contact member for selectively bridging the contacts 5 or the contacts 6 as desired, depending upon whether unit 3 is tilted in one direction or another, for controlling the direction of steering of the

automobile. To assure, bridging of the respective contacts by the ball, the cover portion immediately opposite the ball (not shown) may have inwardly extending lateral guide portions. Instead of using a ball 7, other types of moving contact elements may be used, for example, a globule of mercury to form a mercury switch. However, the latter is sometimes objectionable because of the possibility of breaking of the casing and the spilling of the mercury. A reversing switch operated by contact buttons 8 and 9 selectively reversing the current flow through the armature of motor 13 to reverse the car is also mounted on casing 3.

Figure 3 shows the toy automobile chassis comprising a frame or platform 10 mounted on wheels 11. The rear wheels are driven through gearing 12 by a direct current electric motor 13 of any well known type. A suitable type is one having a permanent magnet field and an armature provided with a wound coil and commutator of well known type, so that the motor is reversible simply by reversing the direction of flow of direct current through the armature coil. An illustration of such motor is one shown and described in U. S. Patent No. 2,465,446 dated March 29, 1949.

The front wheels are mounted on an axle or small platform 14, which is tiltable about a vertically extending pivot 15, so as to steer the wheels either to the right or left. On the axle or small platform 14 are mounted a pair of solenoids 16 and 17, each comprising an electric coil wound in the form of a cylinder and containing therein magnetic cores or pins 16*a* and 17*a* respectively, of magnetic material. The cores 16*a* and 17*a* have a longer projecting portion extending from the end of the solenoid coils, extending inwardly of the vehicle than the projecting portions extending outwardly of the vehicle, so that as either coil is energized, by passing electric current therethrough, the corresponding core will tend to center itself within the coil, that is, within the magnetic field created by the coil, and in so doing will cause the core or pin 16*a* and 17*a* to move outwardly against metal discs 18 and 19, respectively, which are rigidly fastened with respect to the individual front wheels. Each front wheel is independently driven with respect to the other front wheel.

Spring 20 has one end 20*a* connected to a central part of platform 10 and the other end 20*b* rigidly connected to the small platform 14 so that the spring normally biases the forward platform or axle 14 in the direction shown to steer the car in a straight line, forwardly or rearwardly.

In operation, and as will be more apparent from a study of Figures 3 and 4, when neither of the operating buttons 8 or 9 is depressed the circuit is interrupted and no current will flow through solenoids 16 and 17 or through electric motor 13. However, if button 8 is depressed, a circuit will be completed from the battery or dry cells 4 which will cause current flow through the motor armature in such direction as to drive the car forwardly. Should it be desired to reverse the direction of the car, button 9 is depressed which will reverse the direction of current flow through the armature and thus reverse the direction of movement of the car. When either button 8 or 9 is depressed a circuit is also completed through one of the solenoids 16 or 17, depending upon whether contacts 5 or 6 are closed by ball contact 7. Assume that contacts 5 are closed by tilting casing 3 until ball 7 rolls to bridge contacts 5. This will complete a circuit through the coil of solenoid 16, to effect energization thereof and to effect outward movement of the core or pin 16*a* against the disc 18, thus creating a braking action or friction which will retard or stop rotation of the right wheel and tilt front platform or axle 14 about axis 15 as a center and steering the front

wheels towards the right to cause the car to make a right turn. One of contacts **5** and **6** are interconnected.

When it is desired to turn the car to the left, the casing **3** is titled so that ball contact **7** bridges contacts **6** so as to complete a circuit through solenoid coil **17** and interrupt the circuit through solenoid coil **16**. As solenoid coil **17** is energized it will attract core or pin **17***a* outwardly and cause frictional engagement with the braking disc **19** on the left wheel, thus retarding rotation of the left wheel while the right wheel is free to rotate, which results in tilting of the front platform **14** counterclockwise and steering of the car to the left.

An important feature of the invention resides in the ease and speed by which electrical switching can be effected, more specifically the speed by which the remote control unit **3** can be operated. It takes a mere twist of the wrist to cause reversal of the direction of turning of the car, and the mere pressing of either button **8** or button **9** to have the car go either forwardly or rearwardly. Thus, the child or operator may follow the car by holding unit **3** above the floor level and behind the car, and obtain continuous control, enabling the car to travel long distances without interruption to the child's enjoyment of the car movement.

Thus, it will be seen that I have provided an efficient, simple and highly reliable remote control electrical system for a toy automobile or similar vehicle which enables simple and speedy control of the direction of movement, as well as the direction of turning of the toy automobile, and wherein the dry cells for driving the car may be contained within the remote control unit so as to avoid additional loading of the toy vehicle and the consequent additional consumption of electrical power for carrying its load. Furthermore, I have provided a toy vehicle which can be driven continuously and controlled continuously for long periods of time, without interruption, to give the child uninterrupted enjoyment, as well as to develop skill in controlling the movement of an automobile.

While I have illustrated and described a certain, specific embodiment of my invention, it will be understood that this is by way of illustration only, and that various changes and modifications may be made within the contemplation of my invention and within the scope of the following claims:

I claim:

1. A toy vehicle including a frame having supported thereon, an electric motor for driving the rear wheels of the vehicle, front wheels mounted on a supporting member which is tiltable about a central vertical axis to steer the vehicle either to the right or left as a result of tilting movement thereof, a pair of electromagnets, one mounted on each side of said member for selectively magnetically retarding a braking element rigidly secured to the respective front wheels, whereby energization of either of said electromagnets will effect tilting movement of said member and turning movement of said vehicle, spring means for normally biasing said member so as to steer the vehicle in a straight forward or rearward direction, and a portable remote control unit including a dry cell electrically connected to said motor and said electromagnets by means of an electric cord of an appreciable length, so that the unit may be held at a distance from and moved independently of the vehicle, said unit including switching means for selectively energizing said electromagnets to cause selective steering movements of the vehicle, and for controlling the direction of rotation of said electric motor so as to effect either forward or rearward movement of said vehicle.

2. A toy vehicle including a frame member having mounted thereon a reversible electric direct current motor which is geared to drive the rear wheels only of the vehicle, the front wheels being independently mounted on the sides of a steering member which is tiltable about a central vertical axis for steering the vehicle, each front wheel having a disc rigidly secured with respect thereto, a spring for normally biasing said steering member so as to steer the vehicle in a straight forward or rearward direction, a pair of solenoid members mounted on opposite sides of said steering member, each including a core having a longer extending portion in an inward direction than in an outward direction, whereby upon energization of either solenoid, its core will tend to center itself therein and frictionally contact the corresponding disc so as to retard rotation of the corresponding wheel and thereby effect tilting of said member and steering of the vehicle in the direction of the retarded wheel, and a remote control unit connected to said motor and solenoids by a long electric cord, so that the unit may be moved independently of the vehicle and at a distance therefrom, switching means included on said remote control unit for selectively energizing either of said solenoids and for reversing the current flow and thus the direction of drive of said electric motor and of said vehicle.

3. A toy vehicle as recited in claim 2 wherein said remote control unit includes dry cells mounted therein for furnishing power to said electric motor and solenoid members, and wherein said switching means includes a movable contact element responsive to tilting movements of said unit in one direction or an opposite direction for effecting selective turning of the car to the right or left.

4. A toy vehicle including a pair of rear wheels, a reversible, direct current motor mounted on said vehicle for driving said rear wheels, a pair of front wheels mounted on an axle-like supporting element which is pivotally mounted on a central vertical axis, a pair of electromagnets mounted on said supporting member, one on each end portion thereof, for selectively braking either of said front wheels to effect pivotal movement of said supporting member so as to steer the vehicle in the direction of the braked front wheel, and a portable remote control unit including a dry cell and a pair of reversing switches electrically connected, by a long flexible electric cord, to said motor and to said electromagnets, respectively, said unit being movable independently of said vehicle, one of said switches selectively energizing said electromagnets to effect steering of said vehicle either to the right or left, and the other of said switches selectively driving said motor in opposite directions so as to effect either forward or rearward movement of said vehicle.

5. A toy vehicle having mounted thereon a reversible direct current motor for driving said vehicle, a pair of front wheels mounted on an axle-like supporting member which is tiltable about a central vertical axis, electromagnetic means for effecting selective tilting, in opposite directions, of said supporting member about said axis to effect steering of said vehicle to the right or left, and a portable remote control unit including a dry cell and a pair of reversing switches, a long flexible electric cord connecting said dry cell to said motor and to said switches in a manner so that one of the switches effects reversal of said motor, for effecting forward and rearward movement of said vehicle, and the other of the switches effects steering to the right or left of said vehicle, said last named switch including a pair of spaced stationary contacts and a freely movable contact therebetween which effects selective contacting of said contacts by twisting movement of the unit, whereby twisting of the unit in one direction effects steering of the vehicle to the right, and twisting movement in an opposite direction effects steering to the left.

6. A toy vehicle as recited in claim 5 wherein said freely movable contact is in the form of a metal ball.

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