May 3, 1932. A. W. FRANKLIN 1,856,991

TOY OR AMUSEMENT DEVICE

Filed May 24, 1930

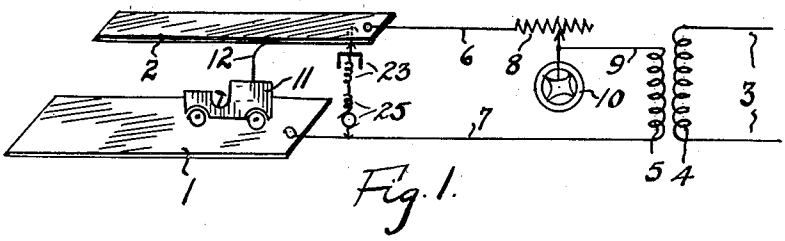


Fig. 1.

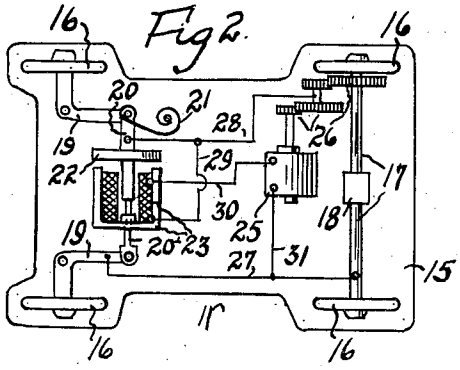


Fig 2.

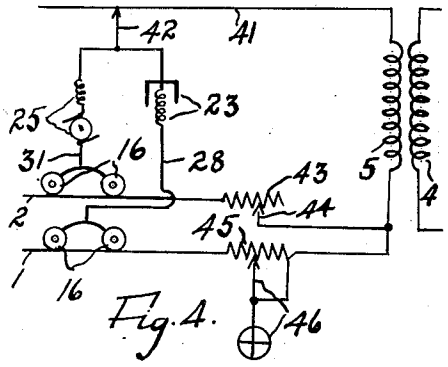


Fig. 4.

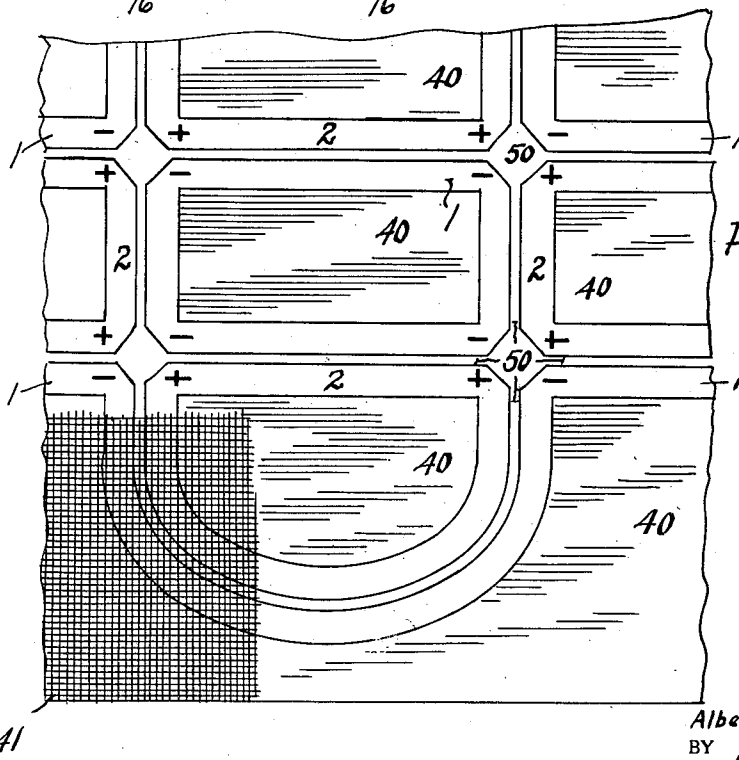


Fig. 3.

INVENTOR
Albert W. Franklin.
BY Darby & Darby
ATTORNEYS.

Patented May 3, 1932 1,856,991

UNITED STATES PATENT OFFICE

ALBERT W. FRANKLIN, OF NEW YORK, N. Y.

TOY OR AMUSEMENT DEVICE

Application filed May 24, 1930. Serial No. 455,231.

This invention relates in general to a toy or amusement device but the principles involved in its construction and operation are not necessarily limited to toys since they may be applied to commercial apparatus.

One of the objects of this invention is the provision of mechanism by means of which a power operated toy or vehicle may be steered externally of the vehicle.

Another object of the invention is the provision in an apparatus of this type of external means for controlling the speed of the vehicle as well as the steering thereof.

A further object of this invention is the provision of a toy or vehicle which may be externally steered and automatically controlled in speed so that the device will slow down as it goes around corners.

A further object of this invention is the provision of mechanism in a device of this type in which the steering and speed control are automatically and simultaneously effected.

A further object of this invention is the provision of a toy or vehicle operated by means of an electric motor which secures the current from two spaced conductors, in the case where the steering and speed control are simultaneously effected, and three spaced conductors in the case where the steering and speed are controlled independently.

A still further object of this invention, particularly in connection with the device when used as a toy, is to provide a unitary assembly to simulate a town or city having streets over which the toy may be operated externally of the toy and the unitary assembly.

These and many other objects, as will appear from the following disclosure, are successfully attained by means of this invention.

This invention resides substantially in the combination, construction, arrangement and relative location of parts, all as will be thoroughly described.

Referring to the drawings—

Figure 1 is a diagrammatic illustration of the form of the device in which the toy or vehicle is steered externally thereof and its speed is automatically controlled;

Fig. 2 is a bottom plan view of the toy or vehicle showing the steering and driving elements, both for use with spaced conductors as shown in Fig. 1 and for use with spaced conductors as shown in Figs. 3 and 4;

Fig. 3 is a plan view of a unitary assembly simulating a town or city employing either two or three spaced conductors; and

Fig. 4 is a diagrammatic illustration of the connections of the apparatus when the steering and speed control are independent.

While this invention will be described particularly in connection with a toy or amusement device, it will be quite apparent from the following disclosure that the principles of the invention may be applied to larger vehicles or carries for transporting persons or goods. It is quite a common practice at the present time to provide mechanical toys which may be arranged into groups comprising units. From time to time new units may be added to the group to increase the size of the device and the child's interest in its operation. An example of this is the modern electric railway toy which comprises an assembly of units to which new units may be added from time to time to simulate a complete railway system.

The features of this invention will be understood with greater ease by direct reference to the drawings. As shown in Fig. 1 two spaced conductors 1 and 2 are provided. The conductor 1 may be in the form of a track or tracks or a large plate, while conductor 2 may be in the form of tracks, a large plate, or even a perforated plate or wire screen. At 3 are the current leads which may be connected to a house lighting circuit for supplying current to the primary 4 of the transformer which includes the secondary 5. One terminal of the secondary 5 is connected by a wire 9 to a movable contact of a hand control 10 which may be, if desired, made in the form of a steering wheel. The movable contact moves over the surface of a resistance 8 which has one terminal connected to plate 2. The other terminal or secondary is connected by wire 7 to plate 1.

The toy or vehicle is connected at 11 and is provided with a trolley 13 which contacts with the upper plate 2. Contact is made

with the lower plate 1 through the wheels of the vehicle which may be of metal. On the vehicle is mounted an electro-magnetic device for steering the device, which is indicated diagrammatically at 23, and a series electric motor for propelling the device, which is indicated at 25. These elements in this form of the device are connected in series as shown in Fig. 1.

In Fig. 2 these elements are shown in greater detail mounted on the bottom of the toy or vehicle. The bottom which may be of insulating material is shown in outline at 15 on which are mounted in any suitable manner the rotatable supporting wheels 16. The rear wheels are connected by an axle comprising the rods 17 which are united by means of the insulating connector 18 which separates the axles electrically. At 19 are the L-shaped supports for the front wheels which are pivotally mounted on the bottom of the vehicle. The upper ends of these supports are pivotally united by a cross link which comprises the portions 20 and 20′ of which 20′ is of insulating material. If desired, of course, this connecting link may be entirely of insulating material. The coil spring 21 is mounted on the bottom of the vehicle and presses on one of the L-shaped members 19 to urge the wheels into a position at an angle with the longitudinal axis of the vehicle.

At 22 is a T-shaped armature of magnetic material which is mounted on the connecting link. At 23 is a U-shaped member of magnetic material which is supported on the bottom of the vehicle and within which is mounted a solenoid winding. At 25 is a small electric motor which is connected to the rear driving axle by means of a series of reduction gears 26. Wire 27 electrically connects the front and rear wheels on one side of the vehicle and wire 28 electrically connects the rear and front wheels on the other side of the vehicle. Wire 28 is connected by wire 29 to one terminal of the solenoid winding which has its other terminal connected by wire 30 to motor 25. Wire 31 connects wire 27 with the other terminal of the motor. These connections are made so that the electro-magnetic steering device and the motor are in series, as illustrated diagrammatically in Fig. 1. The motor in this case is a series motor. The apparatus, as arranged in Fig. 2, may be used with two spaced conductors 1 and 2 which lie in parallel planes, as shown in Fig. 1. It may also be used with two spaced conductors 1 and 2 which lie in the same plane as shown in Fig. 3. When it is used with the conductors arranged as shown in Fig. 1 wire 29, for example, instead of being connected to wire 28 is connected to the trolley 12. When it is used, however, with the conductors of the same plane as shown in Fig. 3 the connections are just as shown in Fig. 2.

In Fig. 3 is diagrammatically illustrated an assembly which may be made to simulate a city or town. The spaces 40 represent the areas where the buildings of the town are supported. The passageways between the buildings provide the streets. The streets are made up of metal plates or strips 1 and 2 which are either supported from each other by air or by means of suitable insulating material and are connected to the wires 6 and 7. Thus all of the strips 2 would be connected to wire 6 and all of the strips 1 would be connected to wire 7 so that the proper polarities are maintained as indicated in Fig. 3. With the arrangement in Fig. 1, or the arrangement of Fig. 3 so far described, the vehicle of Fig. 2 is employed with the connections as shown and simultaneous steering and speed control may be effected externally of the top or vehicle.

Where it is desired to control the speed and steering independently it is necessary to provide a third conductor, which in this case is shown in the form of a wire screen 41 supported above the assembly. This conductor 41 need not be a screen but may be a solid plate if desired. The connections for such an arrangement are shown in Fig. 4. One terminal of the secondary 5 of the transformer is connected to the elevated screen 41. The other terminal is connected to the strips 1 through the resistance 45 and its movable contact 46. This same terminal is also connected to the strips 2 through resistance 43 and its movable contact 44.

In this case a trolley is employed which is indicated at 42, which trolley is connected to one terminal of the motor 25 and one terminal of the solenoid of the steering device 23. The other terminal of the motor is connected to the electrically united wheels on one side of the vehicle by wire 31 and the other terminal of the solenoid is connected by wire 28 to the electrically united wheels on the other side of the vehicle.

It may be well to again emphasize that the vehicle just as it is shown in Fig. 2 may be employed in the assembly of Fig. 3 without the third conductor 41. Likewise the same vehicle may be used in the arrangement of Fig. 1, with the one exception that wire 29 instead of being connected to wire 28 is connected to the trolley 12. The operation of the vehicle in both cases is as follows: With the movable contact of resistance 8 at about the mid-point thereof, and with the current turned on, the front wheel 16 points straight ahead. In other words, spring 21 is so proportioned that with the parts thus set and the current turned on armature 22 will be attracted towards the magnet 23 just sufficient to make the wheels straight. If the movable contact of resistance 8 is moved to

the right the voltage to the steering mechanism will drop and the spring will cause the wheels to move in a direction to steer the vehicle to the left. If the movable contact is moved the other way the voltage across the solenoid will be increased and the vehicle will steer to the right.

Normally, with the connections as shown, these changes in voltage will cause a change in speed of the vehicle. Thus when it steers to the left it will slow down and when it steers to the right it will speed up. This difficulty is overcome by means of the construction of the electro-magnetic steering mechanism. As shown, the armature is in the form of a T with its stem projecting into the solenoid. As the armature moves closer to the coil more impedance is placed in the circuit so that the speed of the motor remains substantially the same. Likewise, as the voltage is decreased spring 21 withdraws the armature. Thus reducing the impedance of the circuit and the motor renders it substantially the same speed. By varying the shape of the armature and its path of movement with respect to the solenoid in a manner well known to those skilled in electrical arts it is possible to slow down, if desired, the speed of the vehicle as it moves in a curved path. This feature, it is to be understood, is within the scope of this invention. Thus by the means described the toy or vehicle 11 can be steered over the surface of plate 1.

The same variations take place when the device is used with the assembly of Fig. 3. In this case a toy or vehicle may be moved over the streets and steered down any desired street at will. In this case the current is derived from the strips 1 and 2 through wheels on each side of the vehicle which are, of course, electrically insulated from each other.

The impedance compensating device for controlling the speed of the vehicle in the arrangement in Figs. 1 and 2 is a very important feature of this invention, since without its use the speed of the vehicle when it is on a curved path would vary considerably; when steering to the left it will slow down and when steering to the right it will speed up. With this arrangement, and depending upon the electrical characteristics of the steering mechanism it is possible to maintain the same speed with the vehicle going straight ahead, or turning to the right or left, or it is possible to give a steady speed straight ahead and to effect a slowing down of the speed when turning to either right or left. The impedance curve of the steering mechanism in the case where the speed is lower in turning both right and left would be a hump curve. In other words, the impedance would be a minimum when the mechanism is set for driving straight ahead and would increase in turning either right or left so that the vehicle would slow down. All of this is, of course, well understood by those skilled in the electrical arts.

When it is desired to control the steering and speed independently the connections must be as shown in Fig. 4 and then a third spaced conductor must be employed. The current supplied to the spaced conductor 41 travels through the trolley and then divides into two paths flowing to the motor and to the electro-magnetic steering mechanism independently and returning through one set of wheels to the same side of the circuit. Each of these return circuits is provided with independently controlled rheostats.

With this description it is believed that the construction and operation of this arrangement is entirely clear.

From the above description it will be apparent that I have devised a relatively simple structure mechanically and electrically by means of which a toy or vehicle may be propelled at variable speeds and steered at will from a point externally thereof. By providing assemblies to simulate cities or towns it is apparent that in the case of a toy a highly amusing device for children is provided. The assembly units may be interconnected by means of bridges so that a very entertaining toy may be constructed.

It is, of course, apparent that the illustrations in the drawings involve certain principles of construction and operation which may be embodied in other physical forms without departing from the spirit and scope of this invention and I do not, therefore, desire to be strictly limited to the disclosure but rather by the limits of the appended claims.

What I seek to secure by United States Letters Patent is:

1. In a device of the type described, the combination comprising two spaced conductors, a vehicle adapted to move over the surface of one of said conductors, a motor on said vehicle for propelling it, steering mechanism on said vehicle for steering it, steering control means externally of the vehicle, and connections to the motor and steering mechanism whereby the vehicle may be simultaneously propelled and steered over the surface of one of said conductors.

2. In a device of the type described, the combination comprising a plurality of spaced conductors, at least one of which is arranged so that a vehicle may move over the surface thereof, a vehicle, electrical means for propelling the vehicle, electro-magnetic means for steering the vehicle, and means controllable externally of the vehicle and connected to the electro-magnetic steering means for controlling the direction of movement of the vehicle.

3. In a device of the type described, the combination comprising spaced conductors, a vehicle having wheels adapted to move over

the surface of one of said conductors, an electric motor and an electro-magnetic steering device mounted on said vehicle and connected in series, a source of current, and connections from said source of current to said conductors including a resistance having a movable contact, the direction of movement of said vehicle being controllable by movement of the movable contact on the resistance.

4. In a device as described, the combination comprising spaced conductors, a vehicle adapted to move over the surface of one of said conductors, an electric motor mounted on said vehicle and connected to the rear wheels thereof, an electro-magnetic steering mechanism connected to the front wheels thereof, said motor and steering mechanism being in series, connections from said motor and steering mechanism for supplying current thereto, and means in said connections for controlling the amount of current supplied to the steering mechanism.

5. In a device of the type described, the combination comprising spaced conductors, a vehicle adapted to run on said spaced conductors, electric current connections from said spaced conductors including a variable resistance, electro-magnetic means on said vehicle for controlling the position of the front wheels of the vehicle, and electrical connections from the steering means to the wheels.

6. A vehicle of the type described comprising a body having a pair of rear wheels journaled thereon and a pair of front steering wheels journaled thereon, a motive device connected to the rear wheels for revolving them, and an electro-magnetic steering device connected to the front wheels for controlling their angular position, said motor and steering mechanism being connected in series.

7. A toy or vehicle of the type described, comprising a body having front and rear wheels, said front wheels being arranged to be angularly adjustable, an electric motor for driving the rear wheels, a combined steering mechanism and impedance control device connected to the front wheels, and means for electrically connecting the steering device and the motive device in series, the movements of said steering device varying the impedance of the circuit to the motive device whereby its speed remains substantially constant.

8. A toy or vehicle of the type described, comprising a body having front and rear wheels, said front wheels being arranged to be angularly adjustable, an electric motor for driving the rear wheels, a combined steering mechanism and impedance control device connected to the front wheels, and means for electrically connecting the steering device and the motive device in series, the movements of said steering device varying the impedance of the circuit to the motive device whereby its speed remains substantially constant, and means for resiliently holding the front wheels in straight ahead position when the normal current is supplied to the steering mechanism.

9. In a device of the type described, the combination comprising a pair of spaced conductors, a wheeled vehicle adapted to move over the surface of at least one of said conductors, electro-magnetic means for controlling the angular position of the front wheels of the vehicle, a motive device connected to the rear wheels of the vehicle, current connections to said spaced conductors including a variable resistance, a connection for connecting the steering mechanism and the motor in series, and means for supplying current from said conductors to said steering mechanism and motor in series.

10. In a device of the type described, the combination comprising a pair of spaced conductors, a wheeled vehicle adapted to move over the surface of at least one of said conductors, electro-magnetic means for controlling the angular position of the front wheels of the vehicle, a motive device connected to the rear wheels of the vehicle, current connections to said spaced conductors including a variable resistance, a connection for connecting the steering mechanism and the motor in series, means for supplying current from said conductors to said steering mechanism and motor in series, and resilient means for holding the front wheels in straight ahead position when current is supplied to the steering mechanism and the variable resistance is properly adjusted.

11. In a device of the type described, the combination comprising two spaced conductors in one plane, a third conductor in elevated plane, a vehicle adapted to operate over the two conductors in the same plane, an electric motor on the vehicle for propelling it, electro-magnetic steering mechanism on the vehicle for steering it, a connection from one terminal of the motor and one terminal of the steering mechanism having slidable contact with the elevated conductor, the other terminal of the steering mechanism having contact with one of the two conductors in the same plane, the other terminal of the electric motor having contact with the other conductor of the two conductors in the same plane, a current source, and an electrical connection from said current source to all of the said conductors, the connections to the two conductors in the same plane including variable resistance.

12. In an assembly unit of the type described to simulate a city, the combination comprising a series of imitation buildings arranged to provide streets, and two sets of spaced conductors providing the floor of each street.

13. In an apparatus of the type described, the combination comprising two spaced conductors, a wheeled vehicle adapted to operate over the surface of at least one of said conductors, an electric motor connected to one pair of wheels of the vehicle for driving it, an electro-magnetic device connected to the other pair of wheels of the vehicle for steering it, and connections between said devices, said conductors, and a current source including a resistance for varying the current supplied to the steering device.

14. In an apparatus of the type described, the combination comprising two spaced conductors, a wheeled vehicle adapted to operate over the surface of at least one of said conductors, an electric motor connected to one pair of wheels of the vehicle for driving it, an electro-magnetic device connected to the other pair of wheels of the vehicle for steering it, and connections between said devices, said conductors, and a current source including a resistance for varying the current supplied to the steering device and the motive device, said steering device being arranged to vary the impedance of the circuit to the motive device.

15. In an apparatus of the type described, the combination comprising two spaced conductors, a wheeled vehicle adapted to operate over the surface of at least one of said conductors, an electric motor connected to one pair of wheels of the vehicle for driving it, an electro-magnetic device connected to the other pair of wheels of the vehicle for steering it, and connections between said devices, said conductors, and a current source including a resistance for varying the current supplied to the steering device, said steering device during the operation of steering being capable of varying the impedance of the motor circuit.

16. In an apparatus of the type described, the combination comprising two spaced conductors, a wheeled vehicle operable over the surface of at least one of said conductors, a current source connected to said conductors including a variable resistance, a motive device for revolving one pair of wheels of said vehicle, an electro-magnetic steering device for steering the other pair of wheels of said vehicle, and connections between said conductors and said motive device and steering device for supplying current thereto.

17. In an apparatus of the type described, the combination comprising two spaced conductors, a wheeled vehicle operable over the surface of at least one of said conductors, a current source connected to said conductors including a variable resistance, a motive device for revolving one pair of wheels of said vehicle, an electro-magnetic steering device for steering the other pair of wheels of said vehicle, connections between said conductors and said motive device and steering device for supplying current thereto, and resilient means influencing the steering wheels and steering device so that they are in straight ahead relation when the current is supplied to the steering device and the variable resistance is adjusted so that approximately half of the resistance thereof is in circuit.

18. In an apparatus of the type described, the combination comprising two spaced conductors, a wheeled vehicle operable over the surface of at least one of said conductors, a current source connected to said conductors including a variable resistance, a motive device for revolving one pair of wheels of said vehicle, an electro-magnetic steering and variable impedance device connected to the other pair of wheels of said vehicle, electrical connections between said motive device and steering device, and means for supplying current to said motive device and steering device, said steering device when actually steering having an impedance which causes the motor to maintain a substantially constant speed.

19. In a device of the type described, a movable vehicle, spaced conductors upon which the vehicle moves, means for steering the vehicle, and an electrical circuit connection thereto to control the steering means externally of the vehicle and hold it in any desired steering position, to positively guide it to the right or left.

20. In a device of the type described, the combination comprising spaced conductors, a movable vehicle mounted thereon, propelling means on the vehicle for imparting motion thereto, steering mechanism on the vehicle, and control means external to the vehicle and connected thereto for controlling the steering mechanism for guiding the vehicle to the right or left.

21. In a device of the type described, the combination comprising spaced conductors, a movable vehicle mounted thereon, propelling means for the vehicle, steering mechanism on the vehicle, and control means connected to the steering mechanism and external to the vehicle for controlling the steering mechanism.

22. The combination with a wheeled vehicle having at least two of its wheels pivotally mounted, electro-magnetic means on the vehicle for pivoting said two wheels to any one of a number of positions to guide the vehicle to the right or left, and means external of the vehicle for controlling said electro-magnetic means to pivot the wheels to any desired position between two extreme positions.

23. In a device of the type described, the combination comprising spaced conductors, a movable vehicle supported to move over at least one of said conductors, means for steering the vehicle, and means connected thereto and operable externally thereof for control-

ling the means for steering the vehicle whereby the vehicle may be continuously guided to the right or left under the positive control of the externally controlled steering means.

In testimony whereof I have hereunto set my hand on this 19th day of May, A. D. 1930.

ALBERT W. FRANKLIN.