United States Patent [19]

Faller et al.

[11] **3,729,866**

[45] **May 1, 1973**

[54] **TOY RAILROAD VEHICLE AND SWITCHING SECTION**

[75] Inventors: **Edwin Faller; Hermann Faller,** both of 7741 Gutenbach, Black Forest, Germany

[73] Assignee: **Gebr. Faller GmbH Fabrik feiner Modellspielwaren,** Black Forest, Germany

[22] Filed: **Oct. 18, 1971**

[21] Appl. No.: **190,124**

[30] **Foreign Application Priority Data**

Oct. 20, 1970 Germany.....P 20 51 343.3
July 23, 1971 Germany.....P 21 36 808.1

[52] **U.S. Cl.**.....**46/216,** 104/67
[51] **Int. Cl.**.....**A63h 19/12**
[58] **Field of Search**.....46/216, 243 LV; 104/67

[56] **References Cited**

UNITED STATES PATENTS

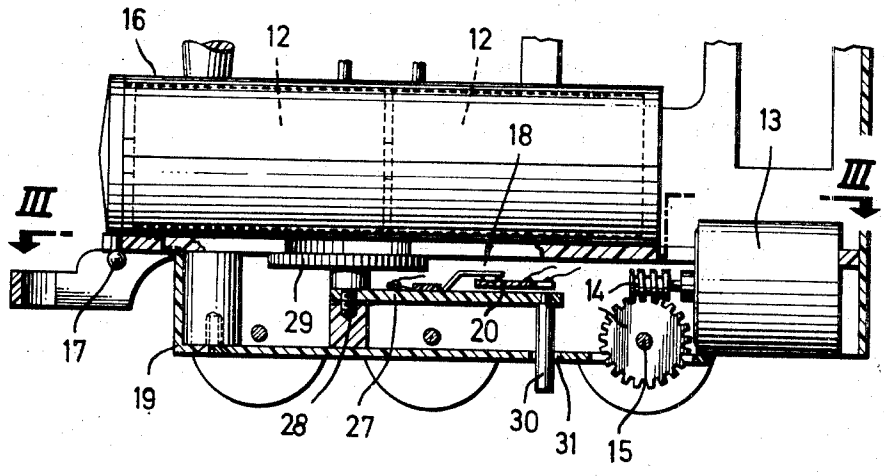
3,438,145 4/1969 Genin.....46/216
3,481,067 12/1969 Cooper.....104/67
3,494,617 2/1970 Glass et al.....46/216

Primary Examiner—Louis G. Mancene
Assistant Examiner—Robert F. Cutting
Attorney—Granville M. Brumbaugh et al.

[57] **ABSTRACT**

A toy vehicle system, such as a battery powered toy railway, comprises a vehicle adapted to run on a base which guides the vehicle. The vehicle has three travelling states, viz. forward, stop and reverse. The base includes at least one switching section provided with a guide adapted to cooperate with a switching element on the vehicle when the vehicle enters said switching section from either direction. The guide may be set for travel in a selected direction or "stop" and thereby changes over the switching element to correspond to the desired setting unless the switching element is already at that setting when the vehicle enters the switching section. The guide may be movable by means of a lever between three transverse positions corresponding to the three settings, or may be movable between only two of these settings or may have a fixed setting.

16 Claims, 10 Drawing Figures



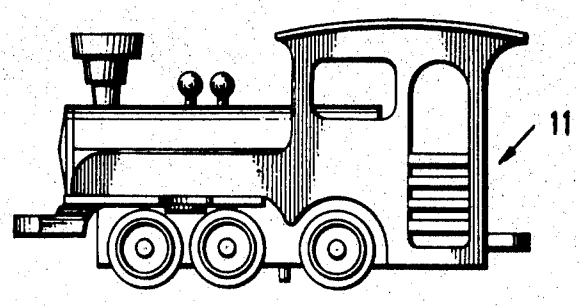


Fig. 1

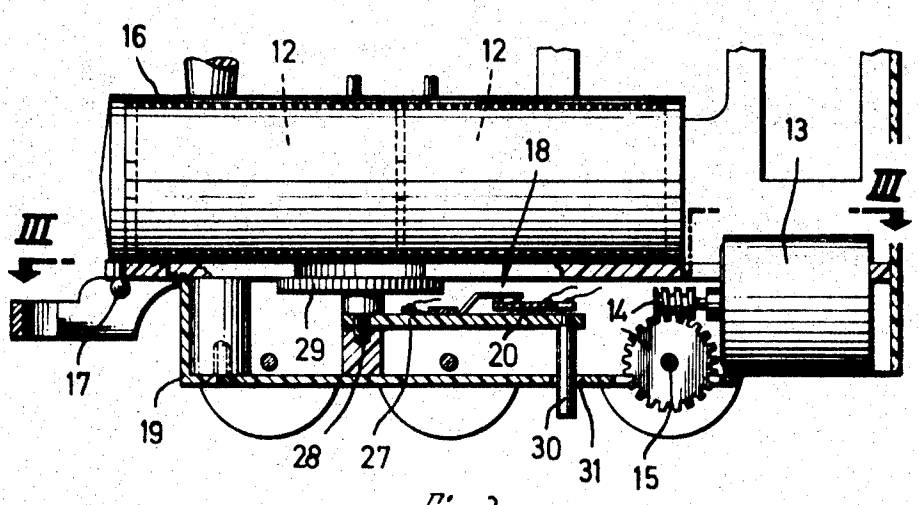


Fig. 2

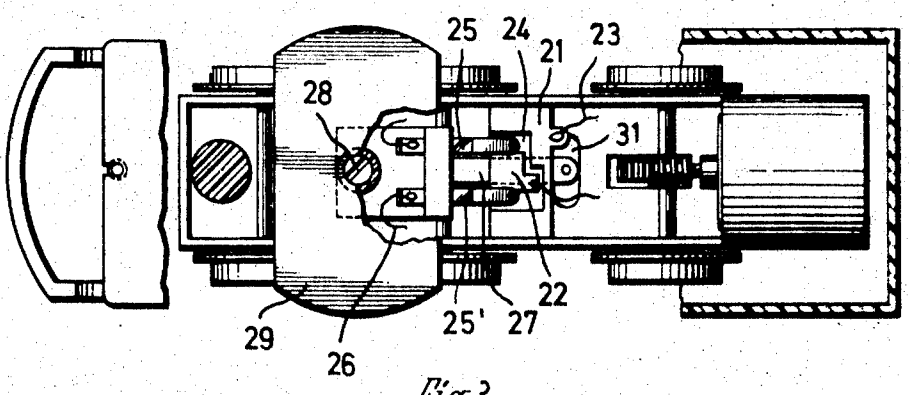


Fig. 3

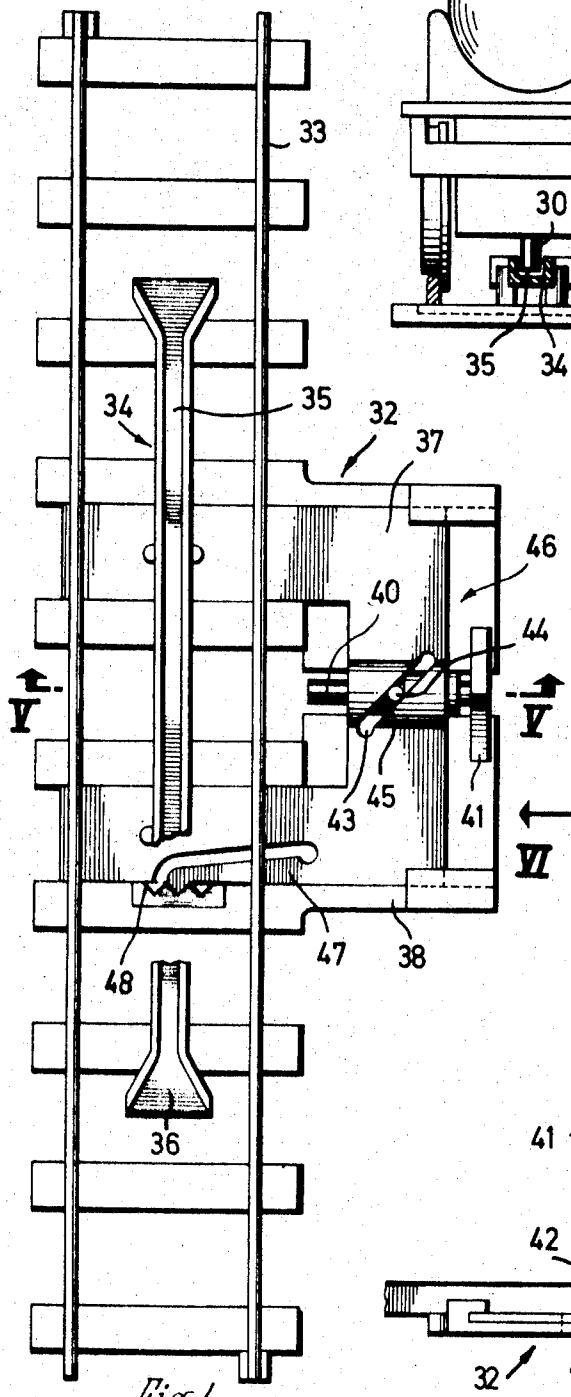


Fig. 4

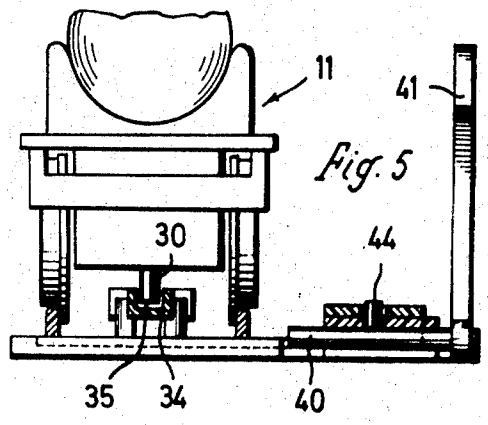


Fig. 5

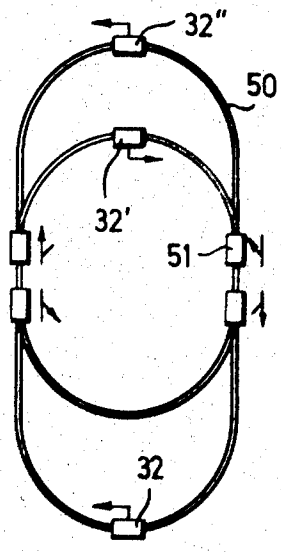


Fig. 7

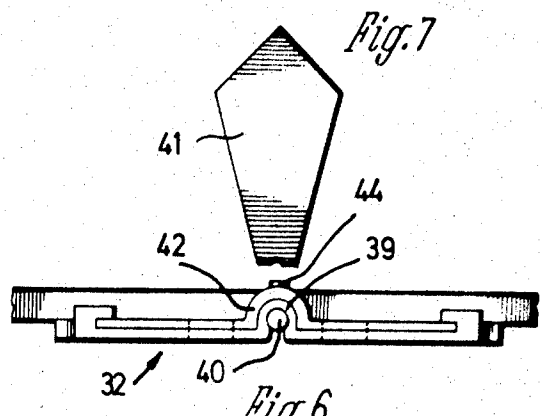


Fig. 6

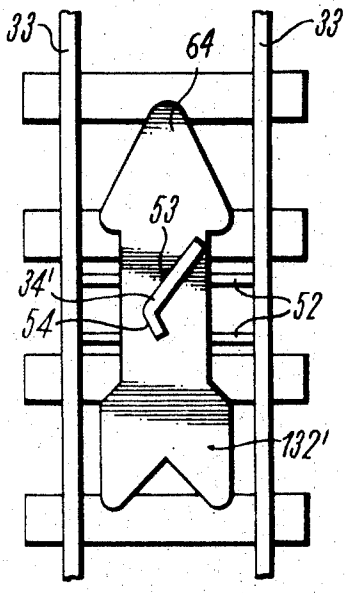


Fig. 8

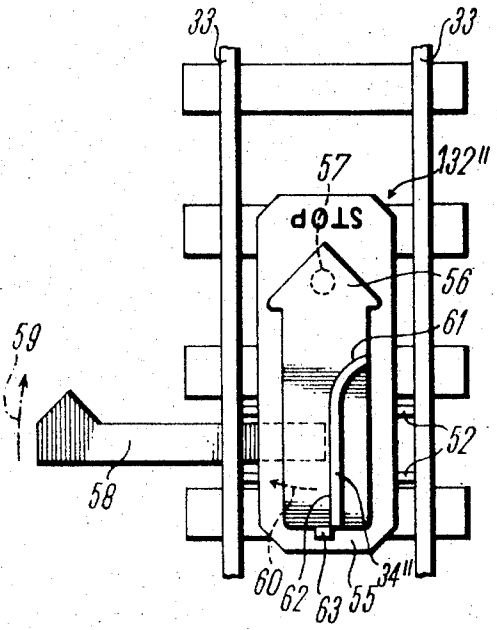


Fig. 9

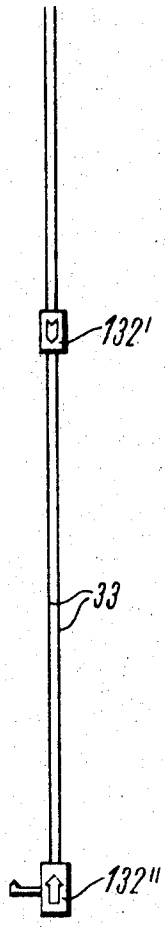


Fig. 10

TOY RAILROAD VEHICLE AND SWITCHING SECTION

The invention relates to a toy vehicle system in which the vehicle runs on a base which guides the vehicle, such as a toy railway driven by an electric battery, and in which the travelling states of the vehicle (forward, stop and reverse) are controllable by a switching section on the base.

In toy railways which have a self-contained power supply, direct external control by varying the current or voltage which is fed to the vehicle is not practical. Normally, the child playing with such railways operates them manually by actuating a switching device on the vehicle, whereupon the vehicle continues to run until it is again gripped manually and switched off or reversed. The possibilities of playing with such a railway are very limited, and the vehicle is readily damaged by constant handling. Railways having a switching section are already known, the switching section acting upon two separate switching levers for "stop" and "reverse," in order to stop or change the direction of travel of the vehicle. However, these switching sections have the great disadvantage that they require great attention from the child playing with the toy, since change of direction is dependent upon the direction and the position (forward or reverse) in which the locomotive enters the switching section.

A feature of the invention is to provide a toy vehicle system of the initially mentioned kind in which change over to the individual travelling states may be effected in a particularly simple manner and in which the possibilities of play thus obtained are considerably increased.

In accordance with the invention, a switch having switching positions for the travelling states is mounted on the vehicle, the switching element of which switch can co-operate with a guide device which is arranged on the switching section insertable into the base, wherein, when the vehicle enters the switching section from any optional direction, the guide device can change over the switching element to that travelling state which corresponds to the selected direction of travel or "stop" setting of the guide device irrespective of whether the vehicle is travelling forward or in reverse.

When the terms "locomotive" and "rail" are used hereinafter instead of "vehicle" and "base," this is intended to refer to all vehicles which travel on rails or track-like bases, such as toy cars on guideways. It will be appreciated that the possibilities of playing with such a system are increased to a considerable extent. At each switching section of which a plurality may be arranged in a preferably endless track, the child playing with the toy sets the desired direction of travel which a locomotive or a train is to assume when it reaches this section irrespective of whether the locomotive is travelling forward or in reverse or irrespective of the direction of travel in which it enters the section. This renders possible a combination of possibilities of play which have scarcely any disadvantages compared with a conventional electric railway supplied by an external source of energy. However, at the same time, operation is so simple that even the smallest child can play sensibly with the system. Thus, there is provided a toy which may be used by children of many age groups.

The invention is further described by way of example, with reference to the accompanying drawings wherein:

FIG. 1 is a side elevation of a locomotive,

FIG. 2 is a partially broken-away longitudinal section through the locomotive,

FIG. 3 is a section taken on the line III—III in FIG. 2,

FIG. 4 is a plan view of a switching section in the rail track,

FIG. 5 is a section, taken on the line V—V in FIG. 4, with a broken-away fragmentary view of a locomotive,

FIG. 6 is a view seen in the direction of the arrow VI in FIG. 4,

FIG. 7 is a diagrammatic plan of a rail track having switching sections as illustrated in FIG. 4,

FIGS. 8 and 9 are plan views of different embodiments of switching sections, and

FIG. 10 is a diagrammatic plan view of a rail track having switching sections as illustrated in FIGS. 8 and 9.

A toy locomotive 11 is illustrated in FIGS. 1 to 3. It is driven by batteries 12 which are accommodated in its boiler and which feed an electric d.c. motor 13. One of the total of three axles 15 of the locomotive is driven by the motor by way of a worm drive 14. For the purpose of changing the batteries, the upper portion 16 of the boiler is removable after a snap device 17 has been disengaged. Electrical power is fed to the motor 13 from the batteries 12 by way of an electrical switch 18 which can assume three switching positions for three travelling states, i.e., for forward and reverse travel and for stopping the locomotive.

For this purpose, the switch has a contact bridge 20 which is connected to the chassis 19 of the locomotive and on the top of which is provided an outer conducting region 21 and an inner conducting region 22. The two regions are connected by way of connection wires 23 to the terminals of the battery. The regions 21 and 22 are insulated from one another and are arranged such that insulated places 24 are formed between the regions 21 overlapping the two outsides, and the center region 22. Two contact springs 25, 25' co-operate with the contact bridge and are connected to the motor terminals by way of connection wires 26. The contact springs 25, 25' are arranged on a pivotable switching element in the form of a switching lever 27 which is pivotable about a screw 28 serving as a pivot. The switching lever 27 may be pivoted manually by way of a hand lever 29 which projects towards both sides from the chassis 19 of the locomotive and which is pivotable together with the switching lever. An actuating pin 30 is mounted at the free end of the switching lever 27 and projects downwardly from the locomotive chassis 19 through a slot 31 provided in the latter.

The switch 18 acts as an "off" switch and reversing switch by virtue of the fact that, when in one outer position (upper position in FIG. 3), the contact spring 25 is in contact with the region 21 and the contact spring 25' is in contact with the region 22. When in the central position illustrated in FIG. 3, the two contact springs are in the region of the insulating places 24, so that the flow of current is interrupted, while, when in a lower position, the contact spring 25' is in contact with the region 21 and the contact spring 25 is in contact with the region 22. Thus, in the respective outer positions

(not illustrated; top or bottom in FIG. 3), the motor runs in different directions of rotation.

A switching section **32** is illustrated in FIGS. **4** to **6**. In order that it may be connected into the normal track for the railway **11**, the switching section **32** also has rails **33** which, however, do not have to act as current conductors and thus may be made relatively simply from plastics material. A guide **34** having a guide slot **35** is arranged between the rails **33**. As may be seen from FIG. **5**, the guide **34** is substantially channel-shaped. It is of relatively great length and has sloping entry portions **36** at each end. The guide **34** is mounted on a slider **37** which engages below the rails **33** and which is horizontally displaceable in a base plate **38** and transversely of the rails. The swivel pin **40** of a lever **41** is journalled in a sleeve-like bulge **39** in the base plate. A bulge **42** in the slider engages over the bulge **39** and has an oblique slot **43** which forms a guideway and into which engages a transverse pin **44** on the swivel pin **40**. During rotation of the swivel pin **40**, the pin **44** can move in a slot **45** which extends across a portion of the periphery of the bulge **39**. The lever **41** and its swivel pin, the slotted guideway **43** and the slider, and the associated parts described, form an actuating device **46** for the guide **34**.

The slider **37** is made from plastics material like all the parts of the switching section **32**, and a portion of the slider **37** is separated by a slot and forms a resilient detent **47** whose lug can engage into any one of three recesses **48** in the base plate in order to arrest the slider resiliently in a respective one of the three positions.

The locomotive and the switching section co-operate in the following manner:

When the locomotive **11** is placed on the switching section, as is partially illustrated in FIG. **5**, the actuating pin **30** extends into the guide slot **35** in the guide **34**. In the embodiment illustrated in FIG. **5**, the lever **41** is located in its upwardly directed position, the pin **44** is in a central position in the slotted guideway **43**, and the slider **37** holds the guide **34** in its central position. Accordingly, the pin **30**, and thus the switching lever **27**, are in their central positions. The switch **18** is switched off and the motor **13** carries no current. If the lever **41** is now pivoted, for example upwardly in FIG. **4** or to the right in FIG. **6**, the pin **44** moves in the same direction of rotation and, owing to the slope of the slotted guideway **43**, pushes the slider **37** to the left in FIGS. **4** and **5**. The guide **34** drives the actuating pin **30** in the same direction, so that the switching lever **27** (FIG. **3**) is pivoted in an anti-clockwise direction, i.e., upwardly. The leads **23** and **26** are connected to the battery and to the motor in such a manner that this movement of the switching lever **27** corresponds to reverse travel of the locomotive.

If it is now assumed that the locomotive had been placed on the switching section **32** in the reverse position, i.e., with the forward direction of travel of the locomotive towards the top in FIG. **4**, the switching lever **27** would have been pivoted in the opposite direction, so that the locomotive would have moved off in forward travel. Thus, with the selected setting of the lever **41**, the locomotive would have left the switching section **32** in the same direction of travel irrespective of which way round the locomotive has been placed on the switching section. Preferably, the actuating device is constructed in such a manner that the direction in which the locomotive leaves the section always coincides with the direction in which the lever **41** is pointing. It is also to be noted that it is completely immaterial as to which way round the switching section is inserted into the rail track. In the above-described construction of the actuating device, the locomotive always leaves the section in the direction in which the lever is pointing.

A locomotive, which enters the switching section in the direction in which the lever is pointing, always has its actuating pin **30** in a position which coincides with the position of the guide slot **35** in the guide **34**. The locomotive travels through the switching section in an unobstructed manner. When a locomotive enters the switching section in the opposite direction to the direction in which the lever **41** is pointing, its guide pin **30** is in the opposite position to the position of the guide **34**. The guide pin **30** then strikes against the corresponding sloping entry portion **36** and is changed over to the opposite direction by way of the stop position. The locomotive then immediately leaves the switching section in the direction from which it came.

In the central position illustrated in FIGS. **4** to **6**, the actuating pin is also guided into the central position by the guide **34**. As may be seen from FIG. **3**, the contact springs **25**, **25'** are on the insulating places **24** of the contact bridge **21**, so that the flow of current is interrupted and the locomotive remains stationary or stops. When the switching section **32** is in the illustrated stop setting, the actuating pin **30** on a locomotive **11** entering the switching section **32** from any direction of travel is guided into the central position by the sloping entry portions, and the locomotive stops.

It will be seen that all functions of the locomotive may be controlled by way of the switching section, both when putting the locomotive into operation (throwing the lever when the locomotive is stationary on the switching section) and automatically when the locomotive enters the switching section. However, in order that the locomotive may be placed on the rail track and put into operation at places at which there are no switching sections, there is provided the hand lever **29** by means of which forward and reverse travel may be set and by means of which the locomotive may be stopped.

It may readily be seen that this manual and automatic actuating possibility for the travelling states of the locomotive provides numerous possibilities of play. By virtue of the obvious association of the position of the lever and the direction of travel, the child playing with the railway can control the direction of travel of the train manually and can also "pre-programme" the direction of travel, so that the train changes its direction of travel and travels over specific portions of the track without external influence. A simple example is illustrated in FIG. **7** which shows a rail track **50** in the form of an external oval and an inner circle, the two self-contained loops being interconnected by points **51**. The main directions of travel which have been set are indicated by arrows adjacent the points. Three switching sections **32**, **32'** and **32''** are arranged in the rail track **50**, and their directions of travel (positions of their levers **41**) which have been set are also indicated by arrows.

A train travelling forwardly in the clockwise direction from the switching section 32 travels up to the switching section 32'' where it is reversed and then travels along the lower inner arc up to the switching section 32' where it is again changed over to forward travel and returns to the switching section 32. It will be seen that a slightly larger system provides many possibilities of variation which enable a child to devise a large number of such functions for himself.

It is possible, within the scope of the invention, to provide a large number of modifications of the described embodiment. Thus, for example, the slotted guideway for controlling the actuating device 46 may be replaced by a different control arrangement for the guide 34, although, preferably, parallel displacement of the guide in the plane of the rails is retained, since this has proved to be particularly advantageous. The points 51 may be of conventional construction, as well as the couplings mounted on the locomotive 11 and the associated carriages, although it must be ensured that they are simple to operate in order to ensure that the railway may be used even by young children.

A switching section 32' inserted into a rail track 53 is illustrated in FIG. 8. The switching section 132' comprises a single plastics material member constructed as a flat member 64 in the form of an arrow pointing upwardly when referring to FIG. 8. The switching section 132' may be engaged or snapped between the rails 33 by means of two transverse ribs 52 formed on the underside of the flat member 64. It will be seen that this enables the switching section 32' to be secured at any optional position on the rail track and in any optional direction. A projection forming a guide 34' extends upwardly from the flat member 64. The guide 34' has a long guide surface 53 extending obliquely to the direction of travel, and a shorter guide surface 54 which also extends obliquely to the direction of travel.

A switching section 132'' is illustrated in FIG. 9 and may also be inserted between rails 33. The switching section 132'' has a flat member 55 which is made from plastics material and which may be clamped between the rails 33 at any optional point by means of transverse ribs 52 formed on the underside of the switching section 132''. An actuating member 56 in the form of an arrow is pivotally secured to the flat member 55 by means of a pivot pin 57 shown by a dotted line in FIG. 9. A switching lever 58 is secured to the actuating member 56 and extends below the flat member 55 and engages through an opening (not illustrated) in the flat member 55.

The actuating member 56 is urged into the position illustrated in FIG. 9 by means of a plastics material spring (not illustrated) integrally formed with the flat member 55, so that the actuating member lies substantially parallel to the rails 33. As is shown by the dotted arrow 60, the actuating member 56 may be pivoted about a pivot pin 57 by pivoting the switching lever 58 in the direction of the dash-dot arrow 59.

A guide 34'' in the form of an upwardly extending rib is arranged on the actuating member 56. The guide 34'' has a sloping or bent guide surface 61 directed towards the pivot pin 37, and a guide surface 62 which, when the actuating member 56 is in its normal position illustrated in FIG. 9, extends substantially parallel to the rails 33 and is located substantially in the center between the rails 33.

The flat member 55 has an upwardly extending projection 63 adjacent the guide surface 62.

The mode of operation of the switching sections will be described hereinafter with reference to FIGS. 8 to 10. When the locomotive 11 is placed on the rails, the actuating pin 30 can engage the guides 34', 34''. When the locomotive 11 travels through the switching section 132' from the top in FIG. 10, its actuating pin is in a position in which the actuating pin is not actuated by the guide 34'. Thus, the actuating pin 30 runs past the guide surfaces 53, 54 without a switching operation taking place, irrespective of whether the locomotive is travelling forward or in reverse. Thus, the locomotive travels straight through the switching section 132'. When the locomotive enters the switching section 132'', the actuating pin 30, which had been directed towards the right during travel from top to bottom in FIG. 10, is urged by the guide surface 61 into the central position and is guided along the guide surface 62. The central position of the actuating pin 30 is the stopping position of the locomotive, and the locomotive is arrested. If the momentum of the locomotive should be too great, the projection 63 ensures that the locomotive cannot travel out of the switching section 32''.

If the switching lever 58 is pivoted in the direction of the arrow 59, the actuating member 56 is also pivoted in the direction of the arrow 60. The actuating pin 30 of the locomotive 11, located in the central position and abutting against the guide surface 62, is then displaced towards the left, so that the direction of travel of the locomotive is changed to the direction which allows the locomotive to travel upwardly (FIG. 10) out of the switching section 132''.

When the locomotive arrives at the switching section 132', its actuating pin 30, directed towards the left, comes into abutment against the guide surface 53 and is deflected into the right hand position by way of the central position. Thus, the motor of the locomotive 11 is reversed, and the locomotive travels back again, i.e., from the top to the bottom in FIG. 10. The guide surface 54 of the switching section 132' ensures that a locomotive, which is pushed manually into the switching section with its switching lever in the central position, is switched into the direction corresponding to the direction of the arrow of the flat member 64.

Thus, it may be seen that the switching section 132' is a station which always ensures change over or passage in the direction of its arrow, irrespective of the side from which the locomotive is coming and irrespective of the direction of travel (forward or reverse) in which it enters, while the switching section 132'', when in its position normally assumed, stops the locomotive and initiates departure in the predetermined direction by actuating the switching lever 58.

The described switching sections are particularly simple to manufacture and to operate and which provide numerous possibilities. For example, the switching section 132'' may be inserted at a terminal railway station where the train automatically stops and then departs again in the opposite direction when desired. This switching section also forms an "automatic buffer," so that the locomotive is prevented from leaving a non-closed section of rail. It will also be seen that the same function may be performed in the opposite direction of travel merely by reversing the member forming the switching section 132'.

We claim:

1. In a toy vehicle system in which a self-propelled, wheeled vehicle having two travelling states and a stopped state runs on a travel guiding means, the travelling states being forward and reverse, and in which the travelling states and stopped state of the vehicle are controllable:

the improvement comprising a switch mounted on the vehicle and having a switching element movable between three switching positions for the two travelling states and the stopped state, at least one switching section on said travel guiding means and switching element guide means arranged at the switching section, said switching element being capable of mechanical switching by said switching element guide means when the vehicle enters the switching section from either direction and having one of three settings corresponding respectively to the two directions of travel and stop thereby to change over said switching element to the one of said travelling states or said stopped state which corresponds to said setting irrespective of whether the vehicle is travelling forward or in reverse when it enters said switching section unless the direction of travel at entry already corresponds to said setting.

2. A system according to claim 1, in which said switching element guide means is displaceable transversely of said switching section between said three settings and in which said switching section further comprises a manually operable actuating device for displacing said switching element guide means.

3. A system according to claim 2, in which said switching element guide means has a guide slot therein parallel to the longitudinal direction of the travel guiding means, the ends of said switching element guide slot having sloping entry portions and in which said switching element has an actuating pin engageable in said slot.

4. A system according to claim 3, in which said actuating device has a lever which is pivotable in a vertical plane extending longitudinally of said switching section and means for transforming pivotal movement of said lever into a linear transverse displacement of said switching element guide means such that the lever points in the direction of its setting in the corresponding two settings of the lever and in its central vertical position is in its stop setting.

5. A system according to claim 4, in which said movement transforming means comprises a slider having an oblique slotted guideway therein and carrying said switching element guide means and a spindle in said oblique slotted guideway and having a pin cooperating with the oblique slot therein, said lever being on said spindle.

6. A system as claimed in claim 5, in which said slider has an integral resilient portion which engages into a corresponding recess in each of the three settings.

7. A system according to claim 1, in which said switching element of the vehicle has thereon an additional hand lever for manually setting the travelling states.

8. A system according to claim 1, in which said switching section comprises an insert member which may be inserted at any optional place in the travel guiding means and whose guide means is pre-set to a predetermined one of said three switching element settings.

9. A system according to claim 8, in which said insert may be snapped into said travel guiding means.

10. A system according to claim 8, in which said switching element guide means comprises an upwardly extending projection fixedly mounted on said insert member and can change over said switching element from one direction of travel into a pre-set direction of travel.

11. A system according to claim 8, in which said switching section includes a pivotally mounted actuating member, spring means biasing said actuating member to the stop setting and a lever for moving said actuating member to a second setting against said switching element spring means, said guide means being provided on the actuating member.

12. A system according to claim 9, in which said insert member has an arrow-shaped configuration pointing in the direction of travel corresponding to said predetermined setting.

13. A system according to claim 8, in which said switching element guide means has thereon switching element guide surfaces which are disposed partially obliquely to the direction of travel.

14. A system according to claim 1, in which said vehicle comprises a battery driven toy locomotive and said travel guiding means comprises a railway track.

15. A system according to claim 1 in which said vehicle comprises a self-propelled toy road vehicle, such as a car or truck, and said travel guiding means comprises a grooved roadway.

16. A system according to claim 1 in which said vehicle is propelled by a self-contained electric motor which is powered by a self-contained battery.

* * * * *