PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in Vehicles for Toy Electric Railways

I, ERNST VOELK, sole personally responsible partner of VEREINIGTE SPIELWARENFABRIKEN ANDREAS FÖRTNER & J. HAFFNER'S NACHFOLGER (a Kommanditgesellschaft registered under the laws of Germany), of 10, Schillerstrasse, Nuremberg, Germany, a German citizen, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The subject of this invention is a vehicle for electric toy railways, which can be controlled from a distance by current impulses transmitted through a magnet which sets the switch mechanism.

Such vehicles exhibit the defect that a short interruption of the current during a trip results in a change in the direction of movement of the vehicle, since such interruption acts as a current impulse which influences the switch magnet, and, through this sets the switch mechanism—such as a switch drum—in operation. As the result, the attraction of the toy is lessened to some extent inasmuch as the running of the vehicle is liable to interruption.

A remote control device for reversing the direction of rotation of an electric motor has been proposed which comprises an electro-magnet influenced by the voltage applied to the motor supply conductors, an armature adapted to be attracted by said magnet and to operate the reversing switch, and a delayed action auxiliary armature pivoted to the first mentioned armature and adapted for attraction by the magnet at a voltage at which the main armature is unaffected, to lock the latter against attraction.

Since when employing a voltage higher than the working voltage of the vehicle it influences the motor of the vehicle during the switching operation, the higher voltage employed for actuating the switch magnet jolts the vehicle, and the object of this invention is to obviate this disadvantage.

Accordingly, the invention consists in providing means which breaks the circuit of the motor while the higher voltage is acting on the switch.

Such a circuit breaker may consist of a contact device subjected to the action of the armature of the switch magnet.

In order to prevent the armature of the switch magnet from being set in oscillation, under the action of the tractive forces to which it is also exposed in the case of the ordinary working voltage—especially when the motor is heavily loaded—with the result, that the contact device is permanently closed when the vehicle is running, and the latter therefore runs in a jerky manner, a further proposal, according to the invention, consists in blocking the armature of the switch magnet in its neutral position. This operation may be performed by means of a blocking member, which is subjected to the action of a second switch-magnet armature that also responds only to a voltage exceeding the ordinary working voltage of the vehicle motor.

In the case of a vehicle designed in accordance with the invention, for electric toy railways, a short interruption in the supply of current will not affect the switch mechanism, and therefore no switching operation will result. Moreover, smooth running is ensured, since, on the one hand, the switching voltage is prevented from acting on the motor of the vehicle, and, on the other, the armature of the switch magnet is blocked in the position in which it keeps the contacts of the motor circuit closed.

The invention will be clearly understood from the following description aided by the accompanying drawings in which a typical embodiment of the invention is illustrated, and in which: Figure 1 is a side elevation of a locomotive, the casing being removed. Figure 2 is a plan of the rear portion of the locomotive. Figure 3 is a diagrammatic representation of the rail track for the locomotive, the switch drum, and the switch magnet, with circuit-breaker and blocking device.

In Figure 3, for the sake of clarity, the switch magnet and the members of the circuit-breaker and blocking device are shown above the pivotal point of the armature *b*, whereas, in Figure 1, they

lie below that point.

The locomotive A takes up current, through the shoe *q* from one of the outer rails *s*, of the track and, through the shoes *r*, from the middle rail *t*. From the shoes *q*, *r* the current is led to the motor *o*, *p* of the locomotive in known manner, the rotational motion of the motor being transmitted to the track wheels through gears (not shown).

The motor consists of the stator *o* and rotor *p*, with the brushes *p1* and *p2*. The rotatably mounted switch drum *x*, is provided, in known manner, with contacts *w*, *w1*, *w2*, *w3*, which coact with contact springs *v*, *v1*, *v2*, *v3*.

In the example shown, the switch drum *x* controls the vehicle for running ahead, stopping, reversing and stopping, according as one or other of the contacts *w*, *w1*, *w2*, *w3* are brought into connection with the corresponding contact springs *v*, *v1*, *v2*, *v3*. If the switch drum *x* is also to perform other functions, such as for switching-on lights, actuating a clutch or the like, it is provided with a corresponding number of contacts co-acting with other contact springs.

The switch drum *x* is actuated by the switch magnet *a*, which responds only to a voltage higher than the running voltage. When the coil of the switch magnet *a* is energized by a current impulse of higher voltage, the rockably mounted armature *b*, is attracted by the end *a1* of the magnet core. It is subjected to the action of a spring *c*, which can be overcome only by a tractive force generated by the higher voltage. The rocking movement of the armature *b* is transmitted to the arm *n*, the upper nose of the part *f* of which bears against the tooth of a ratchet wheel *g*, and moves the latter forward one step. The rotational movement of the wheel *g* is limited, in known manner, by the lower nose of the part *f*. After the wheel *g* ceases to turn, the part *f* returns into its original position. For this purpose, the part *f* is pivotally mounted on the arm *n*, in such a manner that it can slip out of the way, to a slight extent, during its return swing. The rotational movement of the ratchet wheel *g* is transmitted to the switch drum *x* through the pinions *g1* and *g2*.

Each current impulse of higher voltage imparts a further turning movement to the switch drum, in the described manner.

If initially the contacts on the switch drum *x* touch the contact springs which cause the vehicle to stop, the next partial rotation of the switch drum will bring into engagement the contacts for forward running. At the next turning movement of the switch drum, the stopping contacts will be engaged, and at the succeeding movement of the drum, the reversing contacts will come into operation.

The coil of the switch magnet *a* is connected with both the shoes *q* and *r*. Inserted in the motor circuit, which is also connected with the shoes *q*, *r*, through the switch drum *x* is a circuit breaker, comprising the contacts *d* and *e*, the contacts *d* being fixed, whilst the contact *e* is attached to the rocking armature *b*. Consequently, the circuit of the vehicle motor is broken if the armature *b* is attracted by a current impulse of higher voltage, and therefore such higher voltage cannot affect the motor.

In order to keep the contacts *d*, *e* permanently closed, so long as the vehicle is under normal running voltage, the armature *b* is blocked in contact—i.e. neutral—position. With this object, a two-armed lever, pivotally mounted at *i*, is provided, the one arm *m*, of which holds the armature *b* in neutral position, the other arm *h*, being designed as a second armature which is attracted by a current impulse of higher voltage, by the end *a2* of the magnet core. The armature *h*, the neutral position of which is fixed by a stop *l*, is subjected to the action of a spring *k* of corresponding strength.

When the vehicle is under normal running voltage, the contacts *d* and *e* are closed, and the vehicle performs the functions determined by the setting of the switch drum, i.e. runs ahead, or in reverse, or stops. An interruption of the current does not affect the switch drum, since the armature *b* can be attracted only by a voltage higher than the running voltage, and until that occurs is blocked in neutral position. If a current impulse of higher voltage be applied, by means of the controller, the armature *h* will be attracted, and the arm *m* caused to swing outwards. Directly the armature *b* is released in this manner, the armature *b* will also be attracted, the switch drum being thus brought into the next operative position. At the same time the motor circuit is broken by the opening of the contacts *d* and *e*, so that no injurious effect from the higher voltage on the motor can result. After the higher voltage has been switched off, the armatures *b* and *h* are returned to neutral position by the action of the springs *c* and *k*, the contacts *d* and *e* being closed again. The electrical connection between the motor and the switch drum is re-established and the vehicle now performs the functions, determined by the setting of the switch drum, under normal running voltage.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a vehicle for electric toy railways, which is controlled from a distance by current impulses, by means of a switch magnet which sets the switch mechanism, and in which a switch magnet is employed which responds only to a voltage higher than the running voltage of the motor of the vehicle, providing means for breaking the motor circuit of the vehicle while the higher voltage is acting on the switch magnet.

2. Vehicle according to Claim 1, characterised in that the circuit-breaker consists of a contact device which is subjected to the action of the armature of the switch magnet.

3. Vehicle according to Claims 1—2, characterised in that the armature of the switch magnet is blocked in neutral position until higher voltage is switched-on.

4. Vehicle according to Claims 1—3, characterised in that the armature of the switch magnet is blocked by a blocking member, which is under the influence of a second switch-magnet armature that responds only to a voltage higher than the running voltage.

5. A vehicle for electric toy railway constructed substantially as described with reference to the accompanying drawings.

Dated this 27th day of September, 1938.

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Fig.1

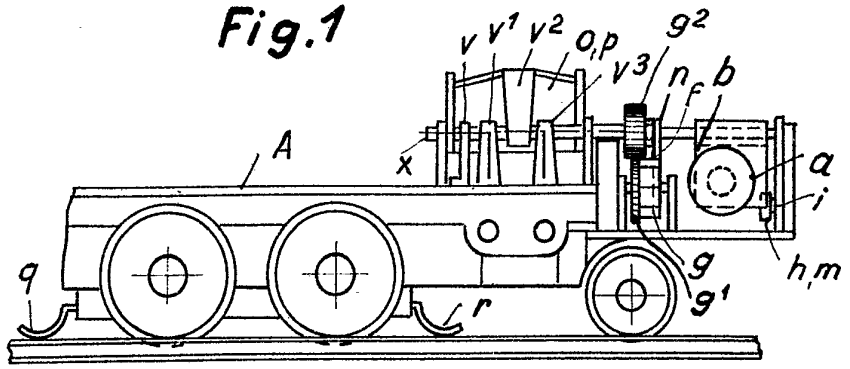


Fig.2

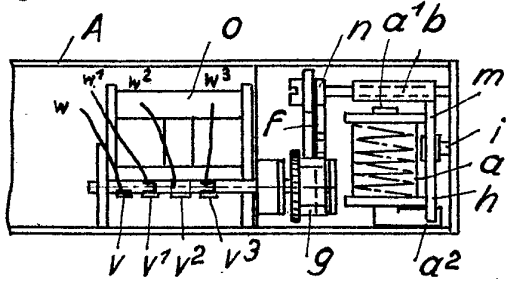
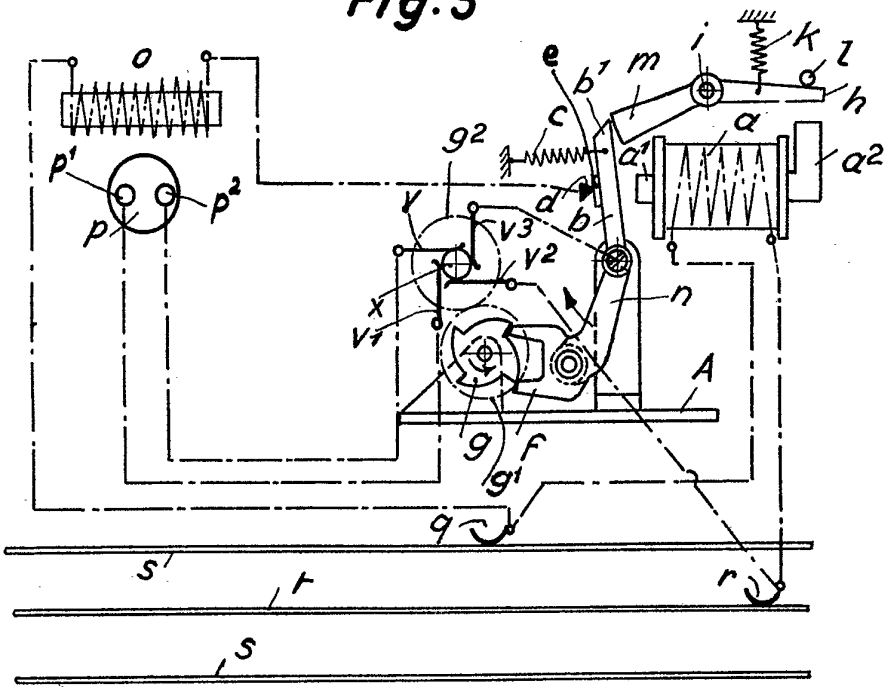


Fig.3



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